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THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol X. Publication Office: TORONTO, JANUARY 1, 1916 No. 1

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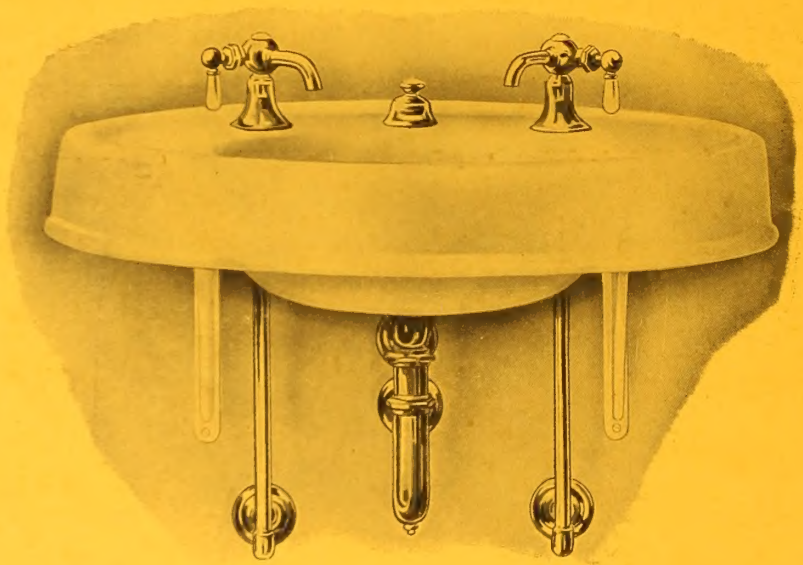

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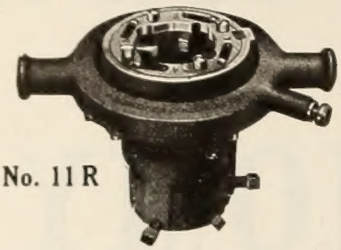

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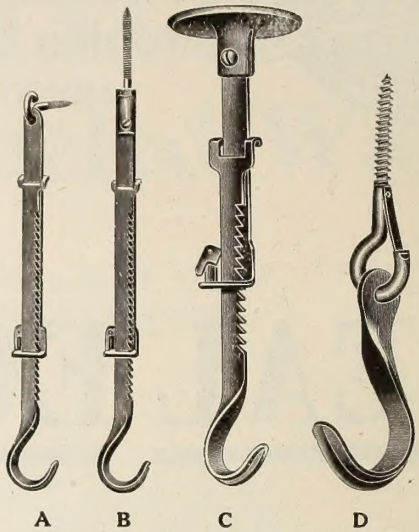

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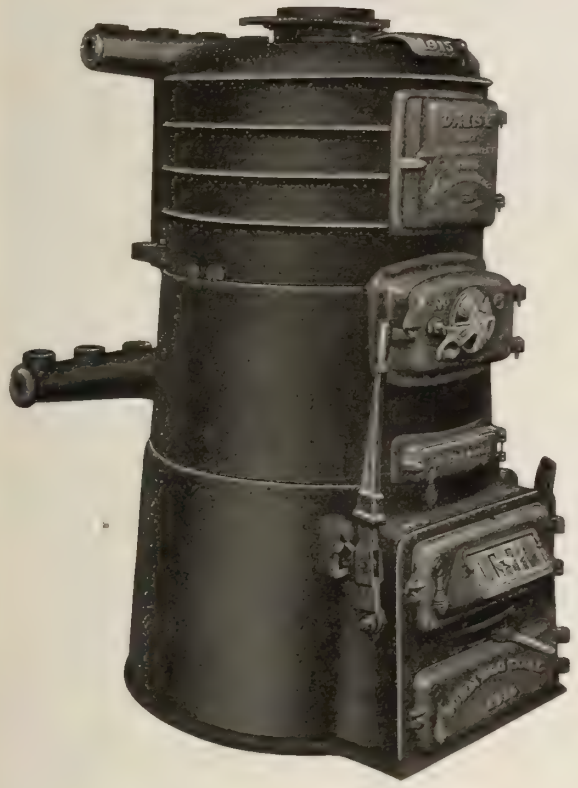

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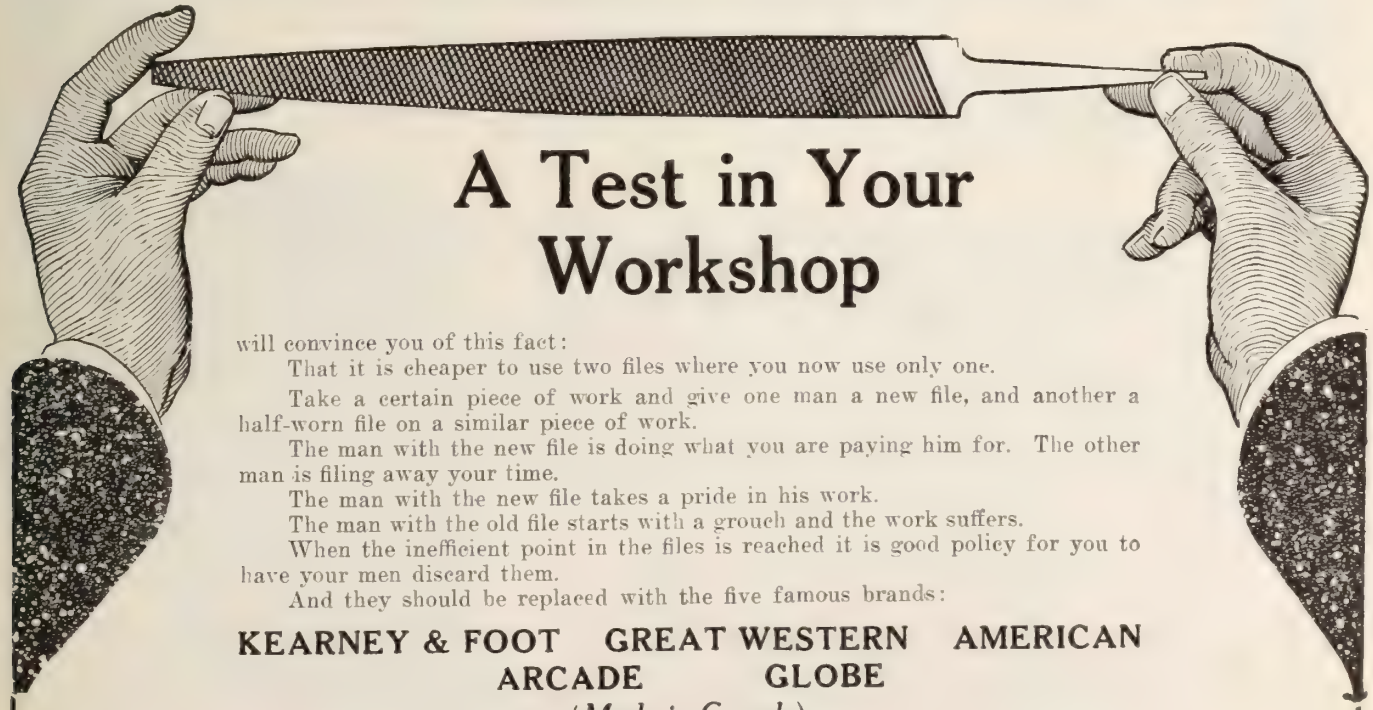

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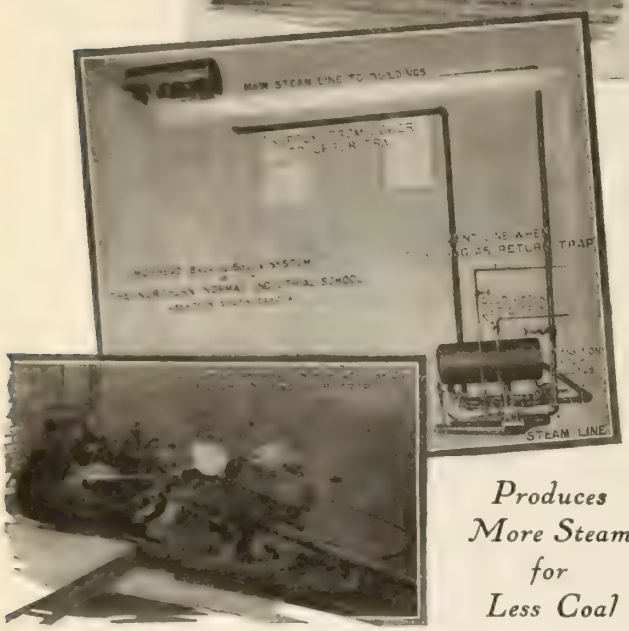

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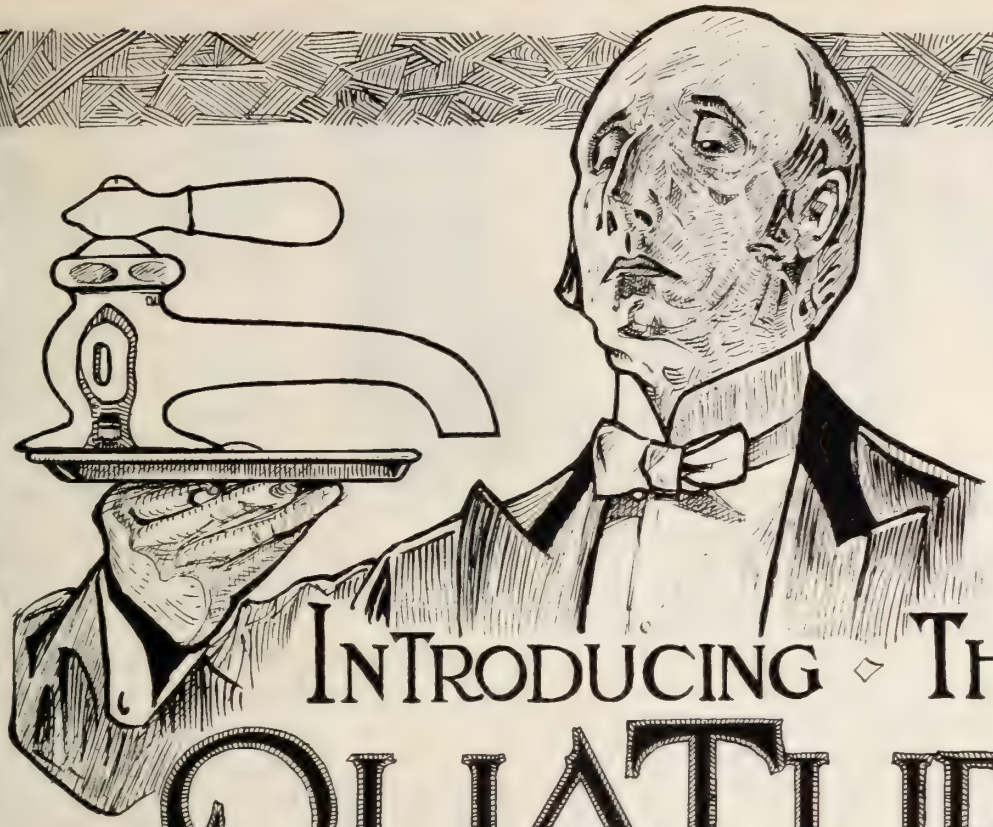

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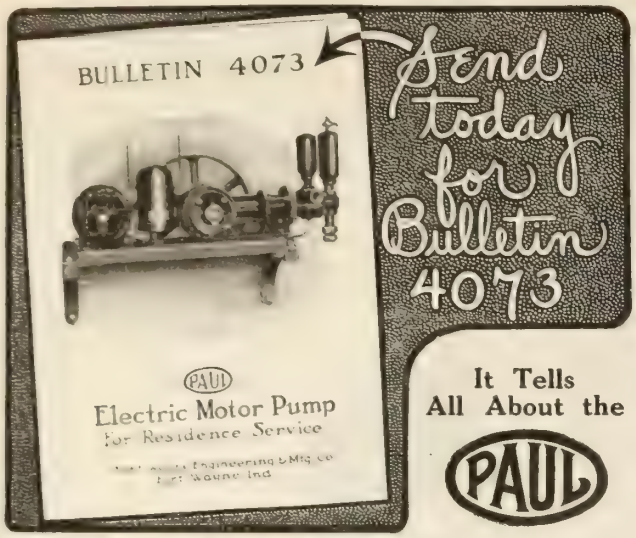

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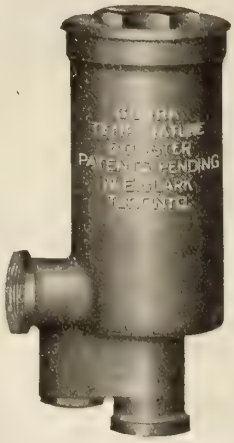

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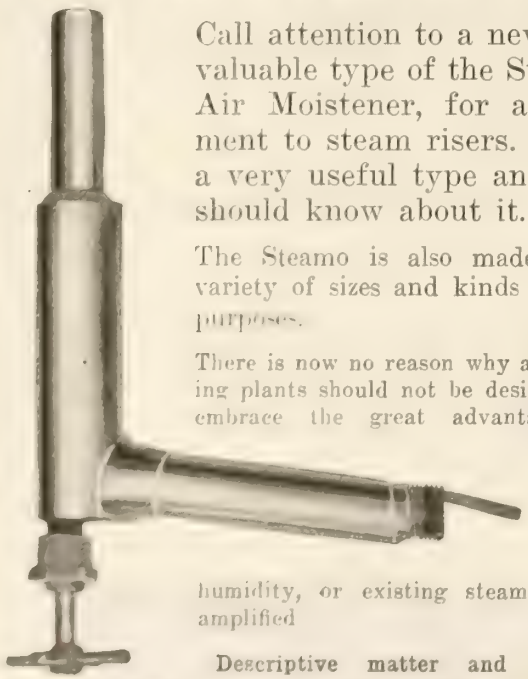

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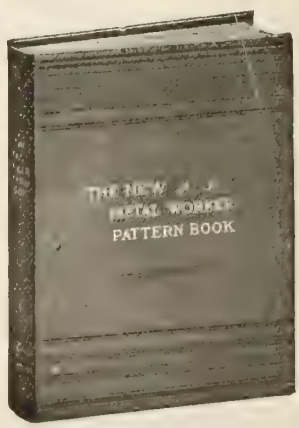

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Re Presto Heater

In order that our name may be in keeping with the character of our business, we have formed a separate company to take care of the manufacture and sales of the Presto Heater.

The Harris Construction Co., Limited, will still continue to look after the other branches of the business, but all matters pertaining to the Presto Heater will be taken care of by the new company and all future announcements will therefore appear over the new name as below.

Harris Heating & Engineering Co., Limited

120 Sanguinet St., Montreal

SANITARY ENGINEER

PLUMBER and STEAMFITTER of CANADA

Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, JANUARY 1, 1916 No. 1

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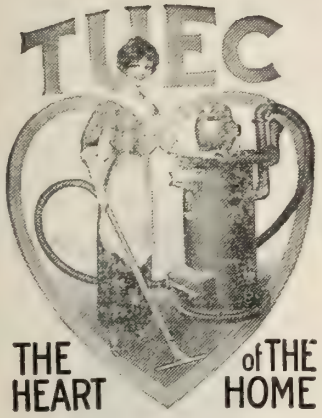

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THE SANITARY ENGINEER

VOL. X. JANUARY 1, 1916 No. 1

Ottawa Public Comfort Station

After Ten to Fifteen Years Discussion, Ottawa Erects a Public Comfort Station. More Should be Built. Example Should be Taken From Our Railway Companies

By H. L. SEYMOUR

SANITARY engineers everywhere throughout Canada, but especially in the large cities, have every reason to look forward to an increase in the general volume of business by the installation of public comfort stations. The belief which has come down to us from our pioneer fathers that Canada is a country of vast spaces, and that its air and its soil are too great in volume to be contaminated, has kept us living as if under backwoods conditions even when the farming village has developed into a busy manufacturing and commercial city. Sanitary knowledge, to say nothing of decency, demands that old conditions shall be improved to meet the growth we have already made, and even more the growth which we may reasonably look for in the very near future. It is not possible to enforce sanitary regulations unless public comfort stations—plenty of them—are provided. Many hotels render a very useful public service in opening their lavatory accommodation freely to the public. But there is no more legal obligation upon them to continue this free service than there is to provide the public with free bed and board.

The great thing to be sought in a public comfort station is the prevention of infection. This means proper sewer connections, proper ventilation and such construction and fittings as will facilitate the most perfect cleanliness.

Until recently even the Capital of Canada, the city of Ottawa, with its population now running rapidly beyond the hundred thousand line, had not a single comfort station within its boundaries. The lack has now been supplied, so far as the centre of the city is concerned, by the completion of the work illustrated by the photographs that accompany this article.

The reason why such works are not more generally undertaken in our large communities is illustrated by the controversy over this Ottawa comfort station.

Mr. Fras. C. Sullivan, a well-known architect and engineer of Ottawa, was commissioned to prepare a scheme and plans. He has, it is understood, given careful attention to this whole question and since 1906 has inspected comfort stations in many American cities and collected the necessary data.

Mr. Sullivan found that the comfort station which shamefacedly hides itself under ground or in a corner is left to be used only by the lower class of the population. This of itself greatly multiplies the problems involved. In the first place city councils tend to deny to such places proper appropriation for maintenance. In the second place, the riff-raff who form the majority of the patrons bring to the place the filthy habits of their ordinary lives and so make the work of maintenance more difficult and more expensive.

On the contrary the comfort station that is manifestly intended for the use of all attracts people of all classes, and, as the majority of people are decent and cleanly in their habits, decency and cleanliness become characteristic of the place. Besides, as the station is a public utility in the true sense of the word, the money to maintain it is not stinted by the powers that be.

Mr. Sullivan therefore proposes a public comfort station in the city hall square, with an approach and showing above ground that would be likely to make the people understand that the institution was intended for the benefit of all.

Fig. 1—View of Ottawa Public Comfort Station Looking North on O'Conner St. . Fig. 2—A Closer View of One of the Entrances.

Not all people have considered this matter. The fact is that Mr. Sullivan [illegible] a good deal ahead of the times so far as Ottawa public opinion is concerned. It is only one generation since the late Goldwin Smith spoke of Ottawa contemptuously as "an Arctic lumbering village," and evolution into a real metropolis is not effected in a day.

Opposition developed to the location and when a change of site was agreed upon, Mayor Nelson D. Porter, who is a good citizen and a good man though typically Ottawan, opposed, even with some bitterness, the efforts of Mr. Sullivan to make the new comfort station attractive to the average person.

The site ultimately chosen has advantages as it would probably be impossible to chose a spot nearer to the busiest part of the city. It is within four blocks of the Central Station and on O'Connor street within a few feet of its junction with the main (Sparks) street that the new comfort station has been built.

For some time after the contract had been let and construction was opposed to have begun the initial work was delayed by the controversy over the appearance which the comfort station should present from the street. The public were not informed of it very fully by the public press, but apparently Mayor Porter wanted a hole in the ground and a ventilation standpipe. The disguising of this pipe seemd to be the only aesthetic problem involved in the matter as he viewed it. Mr. Sullivan, on the other hand, tried to convince Ottawa that such a construction was worthy of correct architectural treatment.

It is [illegible] that Mayor Porter much more nearly represented public opinion than did Mr. Sullivan and a compromise was effected. Fig. 1 shows what passers-by see of the Ottawa comfort station. Working under the conditions imposed, Mr. Sullivan can still be congratulated on the result attained. It must not be supposed that the photograph represents the normal condition of the street. And the usefulness of the station is attested by the fact that 168 patrons of the men's department have been counted in one hour and as many as 1,000 in the 24 hours.

The station except the entrances or approaches is all under ground. It occupies the space under the whole width of the roadway of O'Connor street, being in all 44 feet wide. There is a clearance on the street of over 30 feet for traffic and seven feet for pedestrians on the sidewalks on each side. The exposed parts of the structure are faced with local limestone, rustic brick and topped with Indiana stone.

The station is divided into equal parts, the space on one side being for women and on the other for men, the general arrangement of the fixtures for the latter being shown in Fig. 3. Each side is fitted up on the basis of 4 lavatories and 6 closets, one of which is a pay compartment. On the men's side are 6 urinals. Each side has a drinking fountain and on the women's side is a towel room and a rest room with large basin and mirror.

The two toilet rooms are each 30 feet 7 inches long by 12 feet 5 inches wide and have 9 feet ceilings. The walls are of white enamel tile brick and floors of mosaic tile. The 1¼-inch stall partitions are made of marble from Quebec. There are no skylights but the rooms are artificially illuminated with electric lights placed under the ceiling between the beams.

Siphon jet closets with seat operated flushometer valves are installed. Lavatories and drinking fountains are of the first grade vitreous china. All enamel ware was supplied by the Trenton Potteries of New Jersey, soil pipe and fittings by the James Robertson Co. of Montreal.

The building is heated by a No. 3 Safford "Mogul" hot water boiler. The domestic hot water system consists of a 100 gallon galvanized tank heated by a No. 101 Triumph Premier heater. There is a ¾-inch return pipe to the tank running the whole length of the corridor between the departments to insure hot water always on tap at the lavatories. Both heaters are from the Dominion Radiators, Ltd.

The ventilation of such a building, though important, can only be briefly described here. The cold air enters through the screened panels of the door at the entrance to each toilet room (see Figs. 3 and 5). Over the battery of lavatories and over each water closet is placed, 4 feet from the floor, a white enamelled register face of about 12 inches square. From each of these a 6 inch galvanized duct (see Fig. 6) takes the vitiated air into a main duct which becomes 12 inches in diameter before it reaches an 18 inch fan operated by an electric motor which forces the air out the ventilating shaft and which latter can be seen in Fig. 1. In Fig. 2 one shaft is shown in more detail, and also the copper terminal of the vent stack. The smoke from both heaters

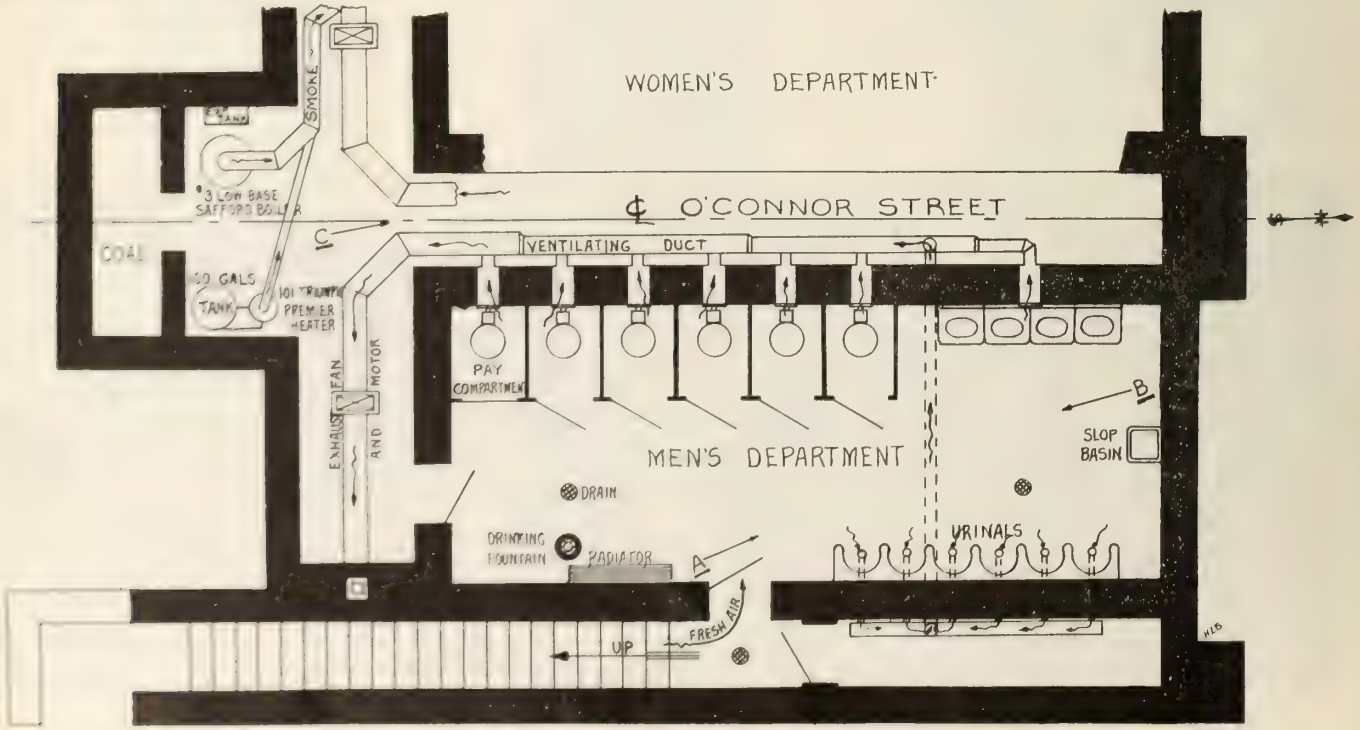

Fig. 1.—Half Floor Plan of Ottawa Public Comfort Station Showing General Arrangement of Fixtures, Heating Apparatus and Method of Ventilation.

passes into the ventilation duct on the women's side before it reaches the shaft, and ordinarily the exhaust fan on this side is not operated.

It is so arranged that the urinals are also ventilated by the ventilating system. This is not for the purpose of preventing the siphoning of the urinal traps, which is, of course, arranged for, but to provide a movement of air that will take away all offensive odors. The ventilating pipe placed under the floor for this purpose is shown dotted in Fig. 3.

The total contract price of the comfort station was $19,708.26, the work being acceptably carried out by Messrs. Murphy Bros., of Ottawa. Messrs. A. Gauthier & Co., sanitary and heating engineers, and well known as one of the leading houses in Ottawa in this line, installed the plumbing and heating in a most creditable manner. The cost was about $4,000, and the work occupied three months, being completed in June of this year. The work in connection with the ventilating of the building amounted to about $500, and was a subcontract awarded to the same firm.

Fig. 6—View in Corridor Taken From Point C Showing Ventilating Ducts Under Which are Shown the Back-Vents From W. C s and Lavatories.

"GET ON TO BROADWAY"

THERE'S a little stretch of car track on a side street in lower New York, writes one of our contemporaries, upon which, at irregular intervals, runs a little bob-tailed horse car. In order not to forfeit its franchise, the company has to run a car once in so often, and the oldest man in the service was assigned the job and held it for years. At night he would drop in at the car barn and turn in his fares—sometimes 25 cents, sometimes 35 cents; never more, often less. In course of time the old driver passed out, and the job was given temporarily to an enterprising young Jew. First day's receipts were 25 cents, second day 30 cents, third day $49.75. The superintendent was dumbfounded. "Where did you get all this money?" he asked, in amazement.

"Why," the new man replied, " business was no good on that side street, so I took the car over on Broadway."

How about the sanitary and heating engineer whose establishment is in a city where, as is well known, there is very little or no building going on? Get out into the broad-way of the rural districts, to the farmer; give him the best service you know of, and you'll turn in more profits. Its simply a case of going where you can get patrons, like the car driver told of in the story told above.

No use going over the same beaten track, bemoaning bad times. Everybody has his own woes, so don't load him up with yours.

Fig. 4—View in Men's Toilet Room Taken From Point A.

Fig. 5—Men's Toilet Room Taken From Point B.

The Cost of Convenience on the Farm

How One Farm Home was Equipped for Happy Living and Working Conditions—All and More Should be Installed in Such a Home, and No One Can do More to Increase the Comfort and Efficiency on the Farm Than Can the Sanitary and Heating Engineer.

By DOUGLAS M. SMITH, B.S.A.

THE farmer is not handling money all the time like a man working for a salary or in a purely commercial business. He may actually take in and pay out more money in a year, but the bank does most of his business for him, while cheques and banks play a small part in the average city man's affairs. This is bound to make a difference. The man used to paying out cash every day of his life sees modern home equipments which are within his means, buys them and thinks nothing of it, while the farmer, well, when it comes to paying $45 cold cash for a washing machine, thinks he could never afford that. The average farmer can afford it much more readily than many city people. He could also afford a furnace, and hot and cold water in the house, and a fully-equipped bathroom, and some other things if he could only see that they are not luxuries, but conveniences that every house should have. The people who have them don't consider them luxuries. They know that they are wise investments.

Five hundred dollars in the bank will bring about fifteen dollars interest, which will in turn be left in the bank, but all the time someone else is using the $500 to make himself richer and more comfortable, while the owner goes plodding along, putting up with all sorts of hardships and smiling to himself because his $500 is drawing 3 per cent. at the bank. So long as the farmer considers only the initial cash outlay, without thinking of the comforts he and his family might enjoy, it is not likely he will invest much money in his home. When he does consider it in the right light, however, there will be things doing. Here is what the owner of a fruit farm in the Niagara district has done in this respect.

Heating System and Full Storage in the Cellar

He had not always had the comforts which he now enjoys. Like many others he had a rather difficult row to hoe until he got started, but it did not take him long to decide that he was going to have as much pleasure as he could afford in the form of a comfortable home. Eight years ago he built the house in which he now lives. It was like many other farm houses, in that it had no conveniences with the exception of a furnace. Sitting around a coal stove at night may be warm and cheery, but there are other parts of the house which may not be quite so cheerful. Having experienced this, he installed a furnace while building his house, so that now, both the upper and lower storeys are well heated, and there are no stovepipes strung through every room, which have to be taken down and put up each year. To install a hot-air furnace in a medium-sized house now would cost about $125.

The cellar under the house was not very large at first, but the owner has done considerable work there since. It is now the full size of the house; it has a cement floor and whitewashed walls, and space is provided for storing the wood and coal, so there is no chasing out to a wood pile during the winter.

Gasoline Engine Pumps Water

The next step was to have running water in the house. Carrying water from the pump or hauling it out of the cistern is not the most alluring job at any time, but when wash-day comes and it is needed by the tubfuls, it should convince any man that there must be some easier way. It did not take this man long to find a way. It meant buying a gasoline engine and considerable other equipment, but he figured out various other ways of using the engine so the expense could not all be charged up to this one item. The best plan for providing running water in the house, and the one used here, is to have the water under pressure in a tank. The tank is installed in the cellar, and is capable of delivering six barrels of water, and costs $75. The two-horse-power gasoline engine, mounted on a small truck, cost $90. It is placed close to the tank along with the pump, which, with the jack, cost $31. The water is pumped from the cistern into the tank, from which it is delivered to the house. All that is necessary to keep the house supplied with water is to start the engine going for a short time whenever the pressure in the tank gets too low.

Hot and Cold Water Supply

In the kitchen there is a large white enamel sink which cost $35. It has both hot and cold water faucets, a boiler connected with the kitchen range giving the supply of hot water. The stove, which would be burning fuel anyway, heats the water, so the only expense is the boiler costing $10.

With the water so convenient downstairs, why not have it upstairs also? The next move was to install a bathroom. No room had been planned for it when the house was built, but it was soon found that a small room above the kitchen would suit the purpose well, so a bath and basin were put in. A toilet was now needed to complete the equipment, so after a septic tank had been built a short distance from the house, this was put in too. During the three years in which the septic tank has now been in operation it has worked perfectly. The cost of the equipment installed in the bathroom was $125, while the septic tank cost about $25, including labor. When asked what he thought of his investments, the ready reply was: "Say, if other farmers only knew what it is like to come in after their day's work, jump into a bath and then come down to tea clean and considerably refreshed, very few of them would stop to think of how much it costs."

Modern equipments may make the house comfortable and reduce the work considerably, but they do not supply pleasure for the spare time which they help create. A piano is one of the things which will fill the gap, but as no one in this family was musically inclined, it was decided to have a player-piano. It might be stated here that ten hours constitute a day's work on this farm, and with music, and a supply of good books and magazines, no person is at a loss to know how to spend the spare time in the evenings.

A telephone is found in the house, even though it costs $25 a year. "It is a high price for a country 'phone, considering the service we get," said the owner, "but we use it a great deal, and during the fruit season it sometimes pays for itself in one day by enabling me to keep in touch with the fruit market."

The Power Washer

And the best is yet to come. In the kitchen the girls can show you the easiest and quickest way to do a wash-

(Continued on page 19.)

Pneumatic Water Storage and Supply

Pointing Out the Governing Principles of the Pneumatic Water System — All Systems Should Provide For Furnishing Air to Replace Loss by Absorption — More Attention Should be Given to This Subject by Those Installing Pneumatic Water Systems

By R. O. Wynne-Roberts, Consulting Engineer, Temple Building, Toronto

Article No. 2

IN the previous article pneumatic storage was considered in its elementary principles. When the practical conditions are studied there are further points for thought and, to make them plain, examples will be calculated. Let it be assumed in Case 1 that the building in which a pneumatic storage and water supply system is to be installed, is 30 feet to the level of the faucets on the highest floor above the base of the tank. It will, of course, be necessary to provide a pressure at the highest faucet which will be say five pounds per square inch or its equivalent of 11½ feet, or say 12 feet, and allowing three feet for friction in the pipe, in all, the water must be raised 45 feet. See Fig. 1.

Forty-five feet is equal to 19½ lbs., which is the minimum gauge pressure in the tank when the last drop of water has been forced out by the expansion of the air, assuming, of course, that air had been pumped in and compressed to 19½ lbs., to balance the weight of water in the supply pipe. The tank shewn in Fig. 1, will have a total capacity of, say, 100 cubic feet. It will ordinarily only be filled two-thirds or three-quarters full of water. Two-thirds full will be assumed in all the calculations which follow. Let

V = the total capacity of the tank, say 100.

W = the maximum quantity of water.

A = the minimum quantity of air.

T = atmospheric pressure of 15 lbs. per sq. inch.

M = maximum air gauge pressure.

P = minimum air gauge pressure when the water has been almost entirely driven out of the tank.

The formulae are:

$(T+P) \times V = (T+M) \times A$: then

$$(T+P) = (T+M) \times \frac{A}{V}; \text{ and}$$

$$(M+T) = (T+P) \times \frac{V}{A}$$

The total initial pressure, as already explained, is 19½ lbs., or 34½ lbs. absolute, and the capacity of the tank is assumed to be 100 cubic feet. The maximum pressure at two-thirds full will be:

$$(M+T) = (T+P) \times \frac{V}{A}, \text{ or inserting}$$

the figures

$$(M+15) = (15+19\tfrac{1}{2}) \times \frac{100}{33.33}$$

$$34\tfrac{1}{2} \times \frac{100}{33.33} = 103\tfrac{1}{2} \text{ lbs. absolute.}$$

Deducting 15 lbs. pressure we obtain the gauge pressure of 88½ lbs.

The foregoing method of calculating the maximum air gauge pressure can be applied to any other set of conditions. A table prepared so as to give the information readily will be found useful, and to illustrate the value of such a tabulation the following abbreviated one has been calculated.

The first column represents the height of water in relation to the height of the vertical tank; the second column gives the proportional volume of air; the third column states the fractional part filled with water, and the fourth gives the factor to use to ascertain the capacity of the tank.

In case II let it be supposed that air had not been pumped in at the commencement to balance the head of water of 45 feet, but that the owner was content to pump in water instead, until the pressure due to the compression of the air was equal to 45 feet. Then, when the tank was two-thirds full of water, the maximum pressure would be much less than in Case I. The volume of air under compression to balance 45 feet head of water or its equivalent of 34½ lbs. absolute pressure would be $\frac{15 \times 100}{43\tfrac{1}{2}} = 43\tfrac{1}{2}$ cubic feet. By the same formula as before but using 43½ instead of 100, the following figures are obtained:

(Continued on page 32.)

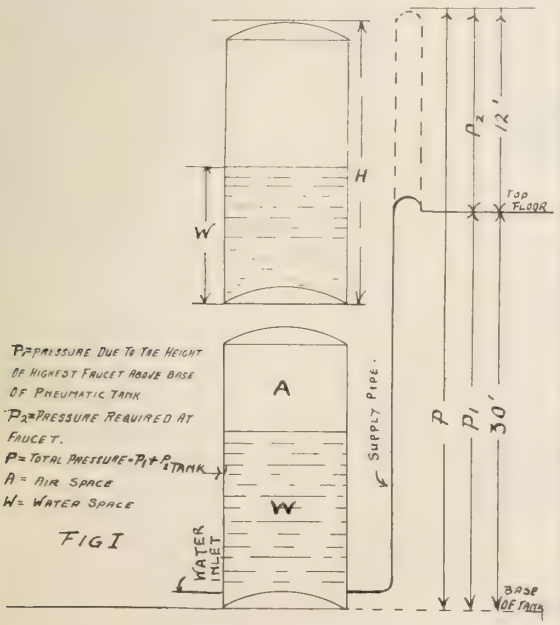

FIG I

W/H	V/A	Proportion Filled.	Capacity Factor	Height in Feet Above Bottom of Tank. 10	20	30	40	50	60	70	80	90	100
				Equivalent Static Pressure in Lbs per Sq Inch. 4·3	8·6	12·9	17·2	21·5	21·8	30·1	34·4	38·7	43·1
				Maximum Air Gauge Pressure.									
100	—	Full	0	—	—	—	—	—	—	—	—	—	—
.90	10	9/10	10/9	178	221	264	—	—	—	—	—	—	—
.80	5	8/10	10/8	81	103	125	146	170	189	211	232	254	275
.70	10/3	7/10	10/7	49	62	78	92	107	123	135	150	164	178
.66	3	2/3	3/2	43	56	69	82	95	105	120	133	146	159
.60	10/4	6/10	10/6	33	44	55	66	76	87	98	109	119	130
.50	2	1/2	2	24	32	41	49	58	67	75	84	92	101
.40	10/6	4/10	10/4	17	24	32	39	45	55	60	67	75	82
.30	10/7	3/10	10/3	13	18	25	31	37	45	50	55	62	68
.20	10/8	2/10	5	9	14	20	25	32	37	42	47	52	58
.10	10/9	1/10	10	6	12	16	21	25	31	35	40	45	50
.00	—	Empty.		4	9	13	17	22	26	30	35	39	43

NOTE. The required pressure at the faucet and the pressure consumed by friction must be added to the height of the faucet above the bottom of the tank.

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 19

Color (Continued From Last Issue)

THE chemist can closely imitate the color of natural water by preparing dilute solutions of salts of platinum and cobalt in distilled water. The color is recorded in terms of the platinum. One milligram of platinum present in one litre of solution gives a color called one, ten milligrams a color of ten and so on. This is generally known as the platinum, or platinum—cobalt, scale and the glass disks referred to in the previous article are made to correspond to this standard. To the average sanitary engineer it is not a matter of importance to know how to prepare standard color solutions as that is ordinarily the work of the chemist. When a water has been sent for analysis the engineer should have, however, a knowledge of what the result means. To aid in this knowledge the following notes are given:—

1. It may be stated that a water with a color below 22 will ordinarily not be noticed by the consumer, whose attention will probably be attracted to the color if it is above 22 on the platinum-cobalt scale.

2. In an article appearing in the Engineering News for December 2, 1915, information in regard to the color of water supplied to cities and towns in the State of Massachusetts is given:—

For 33 cities and towns supplied with ground water the color varied from 0 to 39, and average 12.

For 54 cities and towns supplied surface water the color varied from [illegible] and averaged 25.

This shows that in Massachusetts the surface waters have on the average about twice the color of the ground waters.

3. The [illegible] of Ottawa gives for a typical analysis of the Ottawa River water the color as follows:—

Average 57, maximum 90, minimum 40

[illegible] greater than 22 it is probable that it [illegible]

4. If the color of a public water supply [illegible] consumers will probably object. If it [illegible] 200 nearly everyone would ob[illegible]

From the information [illegible] should be possible, the writer hopes, to gather some idea of the significance of color in water.

It has previously been pointed out that a clear, uncolored water may, under certain conditions be polluted with typhoid or other infection, and that on the other hand a highly colored water may be harmless. Under ordinary conditions it is, of course, preferable to seek the water supply that is the least colored. Records have been kept in the State of Massachusetts and they indicate

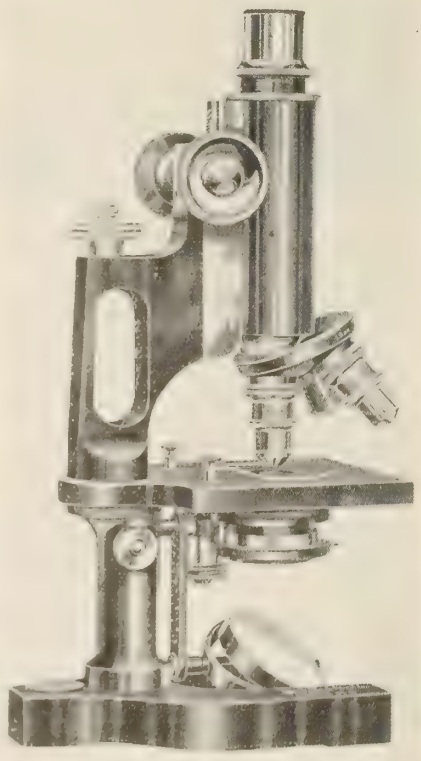

Fig. 45. A Microscope for the Examination of Small Plant and Animal Forms Found in Water.

that there may be a general relation between the color of water supplying a city and the death rate. Comparisons of death rates over 10 years would seem to show that on the average for cities and towns supplied with water having a color below 22 there is a slightly lower death rate combined with a lower typhoid rate than for higher colored waters.

Turbidity

When the water in a pond or lake is disturbed by storms it becomes "roily." This condition of turbidity is caused by small particles, principally of sand or clay, being disturbed and being for a time held in suspension in the water. Clay particles have the effect of making the water more densely turbid than the same amount of sand particles. After a storm a great many of these suspended particles may sink again to the bottom but there are generally a number left and these determine the normal turbidity of the water.

The turbidity of water, whatever its source, is in general due to suspended matter, clay or sand particles as mentioned and also to microscopic plants and animals or finely divided organic matter from vegetable growths. Streams and rivers that pass through areas unprotected by forest growths are generally very turbid as they carry away particles of soil washed off the surface of the ground by rain. The rivers that drain forest areas are generally clear though they may be colored by dissolved organic matter.

The difference between color and turbidity, as can be gathered from what has preceded, is that color is due to dissolved matter and turbidity, to suspended matter. If the color of the water is observed before the suspended matter is removed, the result is, in that case, referred to as the apparent color. When the color in a water is high it is difficult to determine the turbidity as the color gives a much higher determination in the ordinary method used.

The standard of turbidity adopted is such that if a bright platinum wire one millimetre (1-25 of an inch) in diameter can just be seen when it is 100 millimetres (4 inches) below the surface of the water and the eye of the observer is 1.2 metres (about 4 feet) above the wire, then such a water is arbitrarily said to have a turbidity of 100. For convenience the platinum wire is attached to a graduated rod the whole apparatus being then known as a turbidity rod. It has been found that if the wire can just be seen at a depth of 1¼ inches the turbidity of a water so observed is 500; if just seen at 43 inches the turbidity is 7. For these and other readings a scale of turbidity has been prepared, and is marked on the rod.

The turbidity of the Ottawa River has been given as:

Average 16, maximum 300, minimum 3.

These figures illustrate the wide variations in turbidity that may be expected even with the same water supply. This variation is more marked in the rivers of the Western provinces which have their head waters in the mountains, the turbidity during freshets being remarkably high.

Odor and Taste

Odor and taste are closely related to each other though there are some substances like salt that have no odor, and some substances that have odor but no taste. The general relation between taste and odor is illustrated in an amusing incident that came recently under the writer's notice. A little girl, who, it must be remembered, had never **tasted** coffee, was dining at her grandmother's. The little lady was served with tapioca pudding which she seemed much to enjoy. Now, for some reason a paper bag containing coffee had been placed for a time in the tapioca tin, or vice versa, with the result that, as the grown-ups later discovered, the tapioca tasted strongly of coffee. No comment was made until she finished her pudding. Then she turned to her grandmother and said:

"Grandmother, please close the kitchen door. I don't like that **smell** of coffee."

A distinct taste that is not unpleasant may be given to water by various minerals, as in the case of salt, iron or sulphur springs.

The odor of a water contaminated with sewage is sometimes evidence of its pollution though such a test by itself can never be considered as final.

The effect of heating water is to make any odor more easily recognizable. Therefore observation of the odor of both cold and hot samples are made. A chemically pure water is of course without odor or taste whether hot or cold.

The quality of an odor is expressed as:

V for vegetable.
A for aromatic.
G for grassy.
F for fishy.
E for earthy.
M for moldy.
M for musty.
D for disagreeable.
P for peaty.
S for sweetish.

The intensity of an odor is expressed as:—

0 for none.
1 for very faint.
2 for faint.
3 for distinct.
4 for decided.
5 for very strong.

It should be noted that it is hard to compare the intensity of odors of different character; a distinct vegetable odor might not attract as much attention as a faint fishy odor.

Vegetable matter and decaying organic matter are two causes of odor in water, especially in surface waters. In general it may be stated that in such waters the relation between color, odor and taste is such that the higher the color the more objectionable will be the odor and taste. If there is not sufficient organic matter present to give a color to the water that will be noticeable to the consumer, it is generally found that neither is the odor or taste objectionable.

Microscopic plants and animals, growing in quiet ponds, lakes and especially in reservoirs, are the most important and common cause of odors and tastes in drinking water.

Microscopical Examination of Water

The chief reason for a microscopical examination of water probably arises from the fact just stated, that microscopic plants and animals are, under certain conditions, the ordinary cause of odors and tastes in drinking water. A microscopical examination will determine what objectionable organisms are present or whether the odors and tastes are due to other causes.

In "Modern Methods of Water Purification," the following paragraph appears with reference to the microscopic examination of water:—

> "Much may be learned regarding the condition of water from an examination with the ordinary student's microscope, and it is much to be desired that the use of this instrument were more general at waterworks. With a little practice, the observer is able to identify a great number of living and dead objects which occur in various kinds of water supply. Should an intrusion of sewage have taken place, there would almost certainly be revealed some indications, as particles of different food stuffs, starch granules, meat tissues, fibres of vegetable origin and epithelium scales. Sewage also carries filaments of cotton, wool, hemp, a woody pulp used in paper-making, hairs, and many other things derived from the rubbish of the kitchen.

The microscope (in height about one foot) shown in Fig. 45, is suitable for laboratory use in the microscopical examination of water. The circular nosepieces holding the objectives can easily be made to revolve and the power of magnification can be quickly changed as desired.

(Continued in next issue.)

ENTHUSIASM

ENTHUSIASM is the emblem of energy, not an epitaph of ended effort. Enthusiasm is business itch. Enthusiasm tells whether you are in a class or outclassed. Enthusiasm is energy "on the job."

Enthusiasm predicts your position tomorrow. The man that lacks enthusiasm has mud in his mental make-up. His place is in history. If you lack enthusiasm get out of the way, and let some fellow run that can show speed.

Enthusiasm is what gets you home from third—the power that compels you to stock in the home stretch. Enthusiasm is the zeal that puts zero in competition. Cash can buy, but it takes enthusiasm to sell.

One result-getter, one optimist, one enthusiastic, live wire, can do more to ginger up an organization than ten thousand dollars in additional salaries.

Self-reliance, self-confidence, hope, expectations, are some of the pillars of man's prosperity.

The despondent dub, the hopeless human, the forlorn fellow is sometimes tolerated on the payroll out of deference to those who are dependent upon him. It would be eminently cheaper, decidedly better, to pension this pessimistic parasite.

Then, there is the "old governor"—the so-called conservative, the man who officially opposes everything. He is a candidate for respectable retirement, or for impeachment.

To-day it's go ahead or go behind—keep up or get off the trail. To-day it's the survival of successful men. To-day we hold the funeral for the flabby, the infirm in intellect, the groggy grouch.

Every big battle is first lost, then won by an enthusiast.

Enthusiasm is the biggest word in business to-day.—Silent Partner Magazine.

CONVENIENCE ON THE FARM

(Continued from page 16.)

ing. A washing machine is connected with a line shaft driven by the engine in the cellar. The wringer, which is on a swivel so that it can be swung around into any position, works automatically too. This is the washing machine referred to at the beginning, the one that cost $45, but which is considered a good investment, because washing is one of the biggest duties the women have to perform.

The next improvement is to be the building of a garage.

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JANUARY 1, 1916

GREETINGS!

TO my fellow craftsmen and readers of THE SANITARY ENGINEER:

In tendering you my hearty greetings and best wishes for the coming year, I purpose taking advantage of this opportunity to indulge in a few words of confidential chat which I would like every one of my readers to take as being addressed personally to himself. During the past two years I have been privileged to address you at various times on divers subjects through the medium of the articles which from time to time have appeared in this, your trade paper. June 1st, 1913, saw me take up the duties of editor, and I can assure you all that no one could have found work more congenial and more to his liking than have I in carrying out the duties which have fallen to my lot. The work has, indeed, been to me, a "labor of love." I do not mean to say that occasionally, when I have taken pen in hand, I have not experienced a feeling that I would infinitely have preferred to "rough in a stack" or "wipe a few joints," but this does not alter the fact that as far as it has lain in my power I have whole-heartedly and with feelings of the utmost gratification devoted all my energies and efforts to the welfare of my fellow craftsmen, to the amelioration of working conditions and to the uplift of the trade or profession generally.

Many there be, who by their suggestions, their advice and their criticisms, have been of invaluable assistance and have rendered my task easier and still more pleasant. To one and all such I tender my hearty thanks for their welcome aid, and I earnestly ask for a continuation of their much-valued co-operation, and would urge more of my readers to join their ranks.

One thing which the editor of a trade paper can do is to assist in removing evils, of the existence of which he is unaware. Take a case in point to illustrate my meaning. In almost every province in this Dominion there are towns and villages which have no by-laws governing the construction of sanitary engineering. A few earnest and right-minded members of the craft endeavor to formulate a by-law, for months they devote their efforts to this end and eventually they place the suggested by-law before their council, only to have it turned down and shelved indefinitely. This is a case in which the editor of a paper such as this might be able, by giving publicity to the matter, to be of some assistance, but he is rarely, if ever, consulted on the subject.

It is in important work of this kind, readers and fellow craftsmen, that I am anxious to assist you, that I am burning to give you all help in my power. It is my aim and endeavor to prove to the press of the country that such by-laws are an urgent necessity for the well-being of the community generally and are not compiled by the sanitary engineer for the purpose of filling his own coffers.

If you know of any botched work that is being done, let me know of it that I may bring it to the light of day. If you hear of any abuses which are being perpetuated, send me the particulars, that I may use my endeavors to prevent them. Make me acquainted with any evils of whose existence you may be aware and rest assured I shall not be wanting in doing my share towards remedying them.

In conclusion, let me wish you one and all a prosperous New Year for 1916, and let me express the hope that by writing to me and thus giving me your aid you may enable me to turn my own efforts to good advantage for the benefit of the trade in general and the assistance of each one in particular. In this way can you co-operate and assist our mutual advance along the path of progress.

TAKE STOCK AND CREATE BUSINESS

THE year 1915 has passed and gone, Father Time has moved the clock on and we shall have to write the figure six instead of five. What has 1915 done for us? Or rather what have we accomplished for ourselves and our brother man during 1915?

Is this world any better for our having lived? Without doubt we shall reap just what we have sown, no more and no less. Well, the old year is gone, why think of it?

We have a new year before us. What is going to be the outcome? Are we going to simply make a fresh start in the same old rut? Let us hope not.

About the best thing one can do, if it is not already done, is to take stock, start a stock account just as we might open a bank account. Then find out what value there is in the stock. See how long it will require to turn it over.

Next, determine the amount of fixed charges (overhead expenses) which will be needed for the coming year, divide this amount by the number of working days, thus providing for overhead expenses during holidays and Sundays, etc. Keep a credit and debit account of each day or week's work. Make just such resolutions as can be carried out and see to it they are carried out by every member of your staff, yourself included.

The next thing is to make an attractive show in your store window if you have one, and if you have not one, get one. Don't be a back door plumber one moment more than you can help; become a front street sanitary and heating engineer. Become a merchant. Let us just think for a moment what a great amount of wealth is stored up in dark corners, dusty bins or on shelves.

Just a few weeks ago a visit was paid to a sanitary engineer's establishment, where in the stock room there lay a number of new gas water heaters and the owner seemed to wish he did not own them. Now, why not fit up a display of such stock, change the order of this around every week. Put some vim into one's business and results are bound to come.

The whole trouble with 90 per cent. of our craftsmen is that they are like the bear, they burrow for the winter and never screw up courage to look for new business. For instance, why should a gas water heater be a spring proposition? Who ever made it a line for spring sales? Nobody, but it seems quite natural to try and sell a gas water heater in the spring because that is the time the furnace fire is dispensed with. The man who said: "Put a coil or heater in your furnace and you save money," could not have made a more false statement. It is very doubtful whether it is not the most expensive. The gas water heater is just as good and far more serviceable a Christmas or New Year's present as are 90 per cent. of the foolish novelties which are seen on sale during this season of the year. The best advice we have to hand out which cannot fail to bring splendid results is that those who have store windows should make them more attractive and those who have not should procure a place of business where goods can be shown. Get out into the open, take stock, start full steam ahead and thus create new business which otherwise cannot even be seen.

THE GOLDEN RULE

NO doubt every one of our readers will agree that if it were possible to apply the golden rule in business these days it would result in better relations between man and man. But when the word "if" is used one is apt to feel that it is not possible to adopt this rule in business. But, why not?

Rev. Dr. Goodwin Smith of North Hampton, Mass., once gave a lecture on the golden rule, and said he did not think it had been properly quoted as popularly known. "Do unto others as you would have them do to you." He said, "Just read those words over again and again and see if they ring true." see if they do not convey a selfishness on the part of those who put the golden rule "as quoted" into practice. For instance, said he, the business man who has practiced all kinds of nefarious get-rich-quick schemes finds himself with a good big cash account to his credit in the bank, decides that he and his wife would like to gain a little better company, wants to enter into more respectable society, suddenly decides to give to charitable institutions. He gives a ball or garden party in aid of some good cause, and invites some folks of higher morals than those of his own. He is doing to others as he would have them do to him. He is inviting them to his home in the hope that they will do the same to him, purely for selfish gains or motives. And it cannot be deemed that such a construction could be put upon the quoted words of the golden rule.

It might be asked, how, if such be the case how should the golden rule be worded, and the reverend gentleman suggests this. "Do unto others as you would do unto yourself." Now, it will be seen that such words, if put into practice could not be used for selfish gain.

What a splendid change there would be in this world if we would conduct business with such a golden rule as a basis of all transactions. Just imagine! There would be no buying or selling of inferior goods, no skimped job, no price-cutting. The idea would be simply splendid.

If every sanitary and heating engineer would refuse to take a contract to instal too small a boiler, or insufficient radiation; or if inferior goods were specified, would refuse to instal them, simply because they were not of such a grade as one would use in one's own house!

If there is one thing to be desired more than another it is this, that every installation be carried out as if it was for one's self, and not for price.

No part of the equipment of a building is skimped as is the sanitary and heating system and no part is called upon to stand such hard usage. It is about time that we tell the public just what the best will do for them, and not always instal what is specified, when the goods and installation generally are not in accordance with the best practice.

A Chat About Clean-outs

Without Doubt, the Question of Cleanouts is One of Sufficient Importance to Warrant a Change in the Present Common Styles. The Trade Should Hail With Delight Almost Any Improvements, However Slight

By The Troubleman

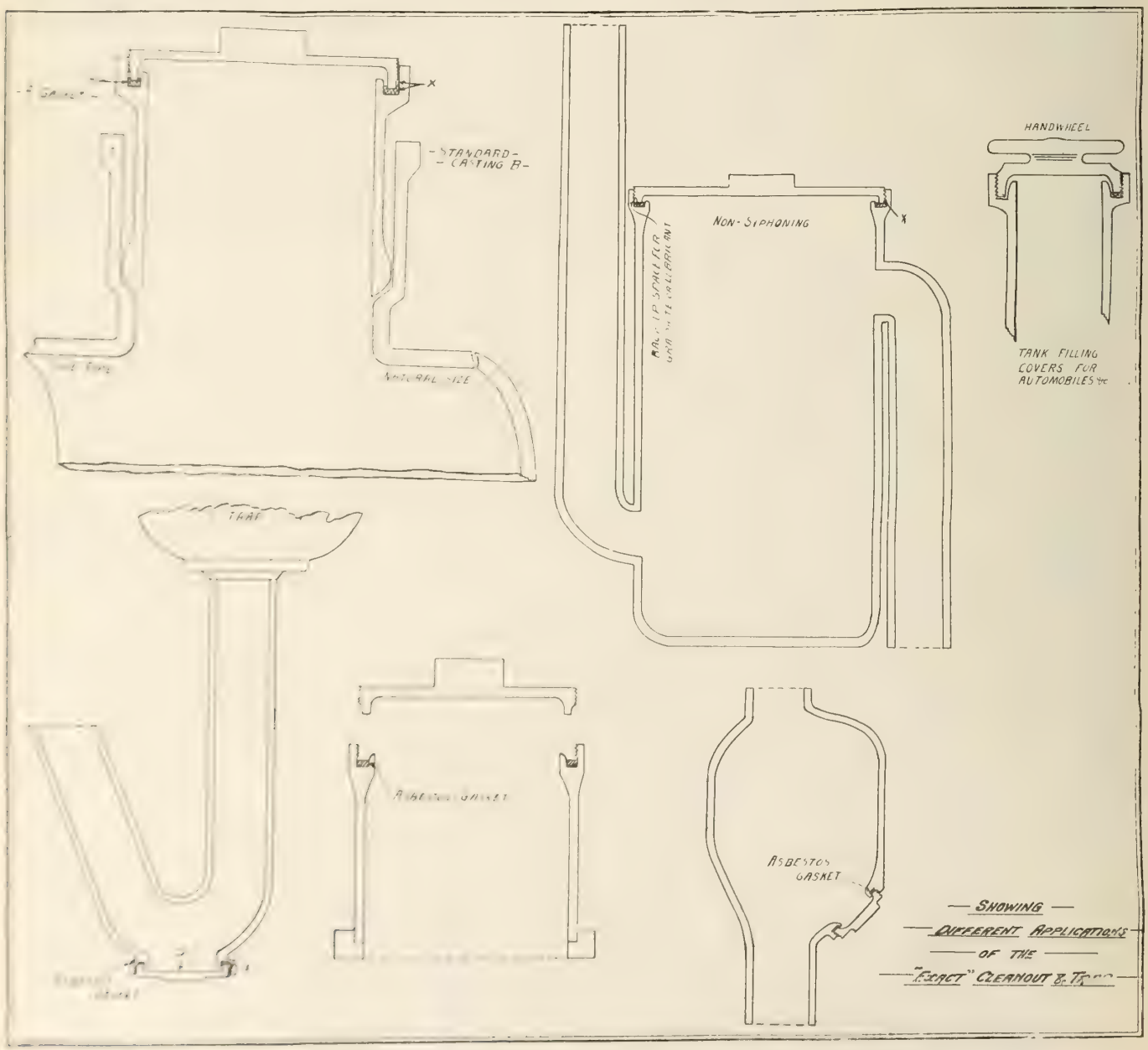
One of the greatest drawbacks encountered by the "Repairman" or "Troubleman" in the plumbing business in his daily routine is occasioned by the unsatisfactory design of Cleanout and Cover Traps generally. Just recently several cleanouts have been presented to the consideration of the trade in both the United States and in Canada. The "Exact" Cleanout and Cover Trap is said to effectually overcome all objections and at the same time meets with approval from mechanical, sanitary, economic and convenience viewpoints—all of which features must necessarily be covered before a satisfactory result can be claimed, will without doubt continue to receive endorsement and be welcomed.

At the last convention of the Canadian Institute of Sanitary Engineers, their Research Committee was instructed to receive designs for a cleanout that would overcome grievous faults, in efforts to provide a much-needed article.

United States patents (others pending elsewhere) have recently been allowed on the "Exact" Cleanout and Cover Trap, and it is the intention to cover the Canadian field thoroughly through the trade journals and other ethical media.

On page 22 of R. M. Starbuck's book entitled "Practical Wrinkles for the Plumber," is a paragraph entitled "Starting Cleanout Screw Covers," which reads as follows:

"Considerable trouble is often experienced in starting cleanout screws.



A steady hard pull on the wrench would often bend the pipe or do other damage, while a sharp, quick blow would often do the work. Some workmen make a practice of using a chisel on the edge of the cover, which will often start it—the objection being the consequent defacement of the edge.

"Before resorting to such an expedient, it is well to fit a wrench to the square head of the cover, having it screwed up as tightly as possible, so that the full strength of the blow upon it will be felt. Then give the wrench a sharp blow at a point about half-way up on the square iron part of the wrench, which will generally result satisfactorily. When this does not have the desired effect, heat the outside screw, keeping the cover cool. If the trouble is in the screw, this will often free it. If the cover is put on with putty (as will sometimes be found) heat the cover to soften the putty."

Or, to quote from an article from the pen of H. C. Dixon, pages 28 and 29, November, 1915, issue of the "Plumbers' Gas and Steam-Fitters' Journal," concerning the faults of the standard and usual trap covers, in his able article entitled "A Chat on Cleanouts by the Troubleman," he says:

"Grease trap covers have to be removed so frequently that the perishing of this packing is noticed and so gets renewed.

"It is in those cases where principally through great care and excellence of the sanitary construction, the cleanout remains for years without removal that the great trouble occurs.

"The gasket being exposed on its edges to the influence of various degrees of temperature and humidity sometimes aglutinates and sometimes decays and crumbles away, leaving the cleanout unsealed and allowing the continuous escape of sewer air into the house.

"Sometimes the careful plumber who finishes the job, foreseeing this, throws away the gasket and makes on the cover with good old red lead and string. Then a green hand from the country is installed as maid, and being unused to modern houses, after cleaning up the bedrooms, she throws her scouring water into the toilet bowl and does not think of removing her floor cloth from the pail, until it has passed around the trap of the fixture and before the troubleman can hook it back out of the bend which makes the connection between the house drain and the main sewer, the cover of the cleanout has been actually cut to pieces in the process of removal.

"Such is the affinity of red lead cement, aided by time, for brass and iron.

"Now the city is not liable for the provision of a new cleanout cover and the troubleman being a person of little skill and less knowledge, thinks the least said the soonest mended. He does not realize the danger of admitting sewer gas into the house, so he just pushes a piece of a potato sack into the orifice and goes on his way rejoicing.

"It is not until the following fall, when the whole family is down with mumps, that the proneness of all the persons in the house to relaxed throat for some time past is traced by the joint efforts of competent doctor and plumber to the ingress of sewer air through the unsealed cleanout.

"Now, cleanouts, access doors (or inspection eyes, as they are variously called) are not ornaments; they are for use, and when, for any cause, there are several feet of water or sewage in the cellar and the city troubleman is called in to let it out through the cleanout of the sanitary sewer, he does not want to be fooling around under water with small bolts; he needs something he can take a wrench to and with one turn loosen sufficiently to take off with about four more turns with his fingers. He should also have one that he can confidently replace with the assurance that it will have a perfect seal without his having to carry around a various assortment of different sized gaskets, etc."

Or, to quote from a letter received from R. H. O'Brien, superintendent of our largest plumbing departments in this section of the country:

"Every sanitary engineer knows that after the old kind of "cleanout" has been in use for a year or longer, it is almost impossible to unscrew the cap. In 75 per cent. of the cases the nut would twist off before the cap would move, thereby necessitating the removal of the old cleanout and putting in another new one. This all means cost to the householder."

Further particulars regarding the "Exact Cleanout" may be procured by writing to the Plumbers' Exact Supplies, Ltd., Fredericton, N.B.

REPORT OF STEAM BOILER BRANCH, PROVINCE OF ONTARIO

For the year ending October 31, 1915, the Steam Boiler Branch of the Department of Public Works, Province of Ontario, through its chief inspector, D. M. Medcalf, has issued its report. From the detail summary given, it will be noted that the work undertaken has been of a comprehensive nature, and is indicative of a thoroughness of purpose to not only maintain the standard of immunity from accident which has prevailed in former years, but of the steady raising of same in the various spheres of boiler design, construction, operation and upkeep.

Detail Summary

Drawings and specificatins of boilers surveyed and registered, 227.

Drawings and specifications of accessories, 266.

Drawings returned to manufacturers for corrections, 22.

Registered boilers inspected during construction, 282.

Plates examined, 1,315.

Plates rejected, 24.

Registered boilers inspected by insurance companies in U.S., 51.

Registered boilers inspected by insurance companies in England, 12.

Used boilers inspected in Ontario, 358.

Used boilers inspected in Canada outside province, 29.

Used boilers inspected in U.S., 16.

Used boilers inspected and refused admission to province, 10.

Used boilers inspected and repaired under inspector's direction, 100.

Used boilers inspected, the pressure for which was reduced, 100.

Used boilers inspected and condemned, 19.

Certificates issued for new boilers, 355.

Certificates issued for used boilers, 374.

Fees for survey designs of boilers, $1,865.

Fees for re-survey designs of boilers, $85.

Fees for survey designs of accessories, $798.

Fees for re-survey designs of accessories, $72.

Fees for shop inspections of new boilers, $1,485.

Fees for inspection of used boilers, $1,995.

Fees for certificates for low presure heating boilers, $170.

WALKING IS GOOD EXERCISE

Walking is probably the best all-round exercise under the sun, and should be indulged in by every person, if not engaged in physical labor, to the extent of at least five miles a day.

As someone has wisely said, "Probably the best medicine you could take is two miles of oxygen three times a day. This is not only the best, but the cheapest and the most palatable. It suits all ages and constitutions. It is patented by infinite wisdom and sealed with a signet divine. It cures cold feet, hot heads, pale faces, feeble lungs and bad tempers. If two or three take it together it still has a more striking effect. It has often been known to reconcile enemies, settle matrimonial quarrels and bring reluctant parties to a state of double blessedness.

Analysis of Canadian Plumbing Bylaws

Proposed New Plumbing By-law for Montreal—Many Clauses Not Only Ridiculous, But Impracticable, Proving That Sanitary Engineers Should be Consulted in Such Matters—The Sanitary Engineer Takes Full Responsibility for the Criticism Published in This Series of Articles.

ARTICLE 8.

RECENTLY in the course of conversation with the writer, one of the readers of the Sanitary Engineer, referred to two things which appeal to him as being of a very important nature.

Said he: "If there ever was anything which proved the real need for a uniform plumbing code in Canada, it is those articles which appear in The Sanitary Engineer entitled analysis of Canadian plumbing by-laws, and the two illustrated articles dealing with the question of soil pipe terminals compiled by the Canadian Institute of Sanitary Engineers."

Those who read these articles cannot fail to have been impressed with the same conviction.

Every thinking sanitary and heating engineer knows full well that 90 per cent. of the laws which govern the proper construction of sanitary and heating systems are natural laws, laws of nature. This being the case, which no one can dispute, makes it all the more possible for a national plumbing code to be brought into being.

Of course we all know there are various climatic conditions to be contended with, but these again are natural conditions.

Take, for instance, the pipe terminal question, there isn't one single condition in the whole Dominion of Canada, where a 15 or 20-foot pipe terminal would really be justified, and those who have adopted them have not really been conversant with natural laws which play a part in [illegible] particular portion of a sanitary in[illegible]

Deck Feed Vent

Section 698.—When a deck trap is supplied from a fixture, the effluent of the fixture shall connect with the inlet, side of the deck trap, and provided the entire effluent or outlet leg of the fixture trap serving the deck trap [illegible] fixture supplying the deck trap need not be vented, but if in excess of five [illegible] fixtures shall be vented.

According to the above section it would appear that if the waste from a fixture is used to maintain the water seal of a deck trap, the trap belonging to the fixture would not require to be vented.

But, if the waste pipe from this fixture be more than 5 feet in length then the trap would require to be vented.

The fact is, such a section serves no practical purpose, and should not be embodied in any by-law, and would not have been if practical men had been consulted in the matter. We do not endorse the use of traps on the rain water pipes from decks and would, therefore, not be inclined to allow the waste from a fixture to terminate into any but the main soil or waste pipe. We do, however, think it quite proper to protect the seal of a trap in as practical a way as can be.

Sidewalk Fixtures

Section 699.—When fixtures are located under sidewalks they may be vented into either the fresh air inlet of the main trap, or they may be vented to an independent vent running to the sidewalk in the same manner of the fresh air inlet. Fixtures thus vented shall comply with these rules and regulations.

Sidewalk Sediment

Section 700.—When fixtures are vented as provided for in the last preceding section, then the avoidance of the collection of and provision for the carrying off of sediment shall be strictly complied with.

Section 699 is certainly about as foolish a by-law as was ever put up for consideration.

Of course in the first place the sanitary engineer does not favor the use of a main house trap in Montreal or the vicinity. But even if such traps were either necessary or proper, the idea of connecting a vent into the fresh air inlet or even into a sewer vent! The former is out of the question, because it would be practically the same as allowing a vent terminal to be situated close to a door or window.

The same argument against the running of a separate vent to the sidewalk would hold good. No practical man would ever have given such a method a moment's thought.

The first part of section 700 has no practical meaning because of the fact of it simply making reference to section 699. The last part of the section, however, refers to a matter not mentioned in any shape or form in any other preceding section.

Section 701.—In all cases where a deck is drained through a trap and the trap is supplied from a fixture, the trap serving the deck shall be vented with a vent pipe not less than two inches inside diameter.

Section 701 is another instance of a by-law of no practical value. It is useless to insert any provisions of so impractical a nature.

In cases such as that of the rain water leader from a deck, these should all be run in as direct a line as possible to a trap situated in such a place as will ensure that it cannot become frozen. Hand hole traps with cleanouts should be placed in such a position as will allow of their being cleaned out periodically.

Hopper Falls

Section 702.—Any hopper or slop sink not located in a summer kitchen and having a wastage drop exceeding one foot in length shall be vented as required for other similar fixtures.

The above section is one which could easily have been dispensed with. In fact, to a certain extent, it is a matter which may lead to a great deal of controversy. For instance, if a hopper or slop sink did happen to be situated in a summer kitchen and did not have a fall of more than one foot, then such a fixture would not require to be vented. Unless some other section demands that they shall be vented, and if there be such a section that does provide for the venting, why refer to the question again? and in such a way as to make room for an argument.

There is another danger too, which should not be lost sight of.

Suppose a hopper or slop sink were to be installed in a summer kitchen, the waste pipe of which has less than a one-foot fall, and later the building had some addition made to it; the summer kitchen being turned into a winter kitchen. What then? It would require a lot of watching to attend to all such matters.

It is cases of this kind which justify an annual inspection of all plumbing, a thing which The Sanitary Engineer would endorse to the limit.

Five-Foot Limit Into Hopper

Section 703.—When the entire waste of any fixture discharging into an open hopper or slop sink exceeds five feet in length, the said fixture shall be properly vented.

Double Hubs Vents Only

Section 704.—Double hubs shall be permitted on cast iron vent pipes only.

Section 703 deals with matter which could easily have been provided for in a former section. Section 704 too, could easily have been embodied in some other section, thus eliminating a mulitiplicity of sections.

Fittings Galvanized Three Inches

Section 705.—All vent pipes and fittings of an inside diameter less than three inches shall be galvanized, three-inch and larger may be cast iron, or of galvanized wrought iron pipe, and the fittings and pipe shall be either tar dipped or galvanized, but in all cases all malleable iron fittings shall be galvanized. Combination waste and vent fittings which are tapped at all openings, or tapped or belled for caulking are allowable.

The above is a section of no small importance, the first sentence debars the use of 2 in. cast iron pipe or fittings for vents. We fail to see any reason why this should be, and with zinc at the price it is to-day, this section would be a hardship to both the trade and customer.

There can be no valid reason why, under certain circumstances, a two-inch cast iron vent could not be used, and particularly if such vent be tarred, though we do not endorse the using of tarred pipe for vents.

The rest of the section refers indirectly to the former part.

Three-Inch Cast Iron Vent

Section 706.—It is allowable to use three-inch cast iron for vent as an extension of cast iron waste in lieu of galvanized wrought iron.

Kitchen Extension and Roofs

Section 707.—When fixtures are located within kitchen extensions, or when a roof is used for yard purpose, or when an opening in the main building is to be guarded, then the ten feet limit referred to in 708 and 709 shall be enforced, and the vents shall be either extended beyond the ten-foot limit or carried higher, as the case may demand. When it is not practicable to otherwise prevent gases entering the premises, then the end of vent shall be carried to a point not less than one foot above the line of the main roof.

Vents Ten Foot Limit

Section 708.—No soil or vent pipe shall terminate at a point within ten feet of the bottom of any door or window.

Section 706 is another matter which could easily have been settled in some former section, and is really of very little working value.

Section 707 refers to a subject recently dealt with by the Canadian Institute of Sanitary Engineers—that of soil pipe or vent terminals.

If any pipe because of its location is likely to project through any roof or other area near to any door or window and within distance specified in section 707, there can be no reason why this pipe should not be properly offset into the area of the main or higher portion of the building, and upward until it terminates through the roof of the higher portion. Then, as experience has proved, this pipe should be increased in size not less than two inches.

Another part of section 707 is somewhat irregular even according to its own wording.

For instance it says: "The vents shall be either extended beyond the ten feet limit or carried higher, etc."

It further goes on to demand that "when it is not practicable to otherwise prevent gases entering the premises, then the end of vent shall be carried to a point not less than one foot above the line of the main roof."

To carry out this latter part could of course be done in two ways providing the line on roof was properly defined.

It does not say whether the line shall be the rain water guttering, or the ridge.

Even under this section gases could be prevented from entering the building in two ways. One, in a practical manner by carrying the vent, as suggested previously, to a point into the main building and installing it vertically through the roof of the main building, or else by extending it to almost any ridiculous height.

Section 708 is only a repetition of previous sections, though it is worded a little differently.

It demands that no soil pipe or vent shall terminate at a point within 10 feet from the bottom of any door or window.

Note "the bottom." This would mean that even a terminal which protrudes through any roof, must be further than ten feet from the bottom of any door or window, even though it be through the roof, the window of which same may be a part.

Vent Above Roof or Coping

Section 709.—Every vertical soil, waste and vent pipe (unless otherwise provided for) shall extend full bore to a point not less than one foot above the highest line of roof or coping, and be continued to a point at least ten feet from any opening of the house or of an adjoining building.

The first part of Section 709 is very interesting at this time, because of the fact that we published a five-page article upon the subject in the Dec. 1 issue of The Sanitary Engineer.

The tests made by the Canadian Institute of Sanitary Engineering proved that a short terminal gave the best protection against closures by hoar frost and that a terminal one foot long did not give as satisfactory results as a short one. The pipe terminal approved by the craft in the Western provinces would give equally as good results in Montreal and Ottawa districts. The writer experienced quite a lot of trouble in the city of Ottawa in being called out to open soil pipe and vent terminals, and would strongly advise that the pipe terminal question be thoroughly gone into by any city before a definite stand be taken regarding this important matter.

Caps or Cowls

Section 710.—No cap or cowls shall be affixed to the top of any ventilating pipe although a strong wire basket may be affixed.

The above section no doubt means that no caps, cowls, etc., be placed on any roof terminal, but if installation of the main house trap and fresh air inlet or breather is to be enforced, we would certainly feel that a cap should be placed on such a pipe. It is a ventilating pipe, without doubt, but under this section could be installed without such a cap. But if, as we assume, that Section 710 is meant to simply refer to roof terminals, there should be no cover of any kind, not even a wire basket cover.

(Continued in next issue.)

PLUMBERS REQUIRE LICENSE

The new plumbing by-law for the St. James district, Winnipeg, Man., recently passed by the Assiniboia Council, came into effect January 1. Under its provisions all plumbers doing business will be required to pay a two dollars license fee, and after that a business fee of one dollar per year. With the water and sewer mains now practically complete in the district, the residents are installing the necessary plumbing connections to secure these conveniences as soon as possible, and the health officers of the district are kept busy at present attending to permits and other details incidental to the new improvements being placed in the houses.

All the while opportunities are going by for learning more about your own business. You never know when the one most valuable tip of all is coming along. Be on the watch every minute and let nothing get away that might prove useful.

New Sanitary and Heating Goods

NOW ON THE MARKET

We announced some months ago that the Wallaceburg Brass Mfg. Co. had acquired the Canadian rights for the "Quarturn" line of lavatory cocks. On account of business of a more urgent nature coming to the fore, the "Quarturn" line was allowed to stand in abeyance. However, these goods can now be procured. The manufacturers make some very novel claims for this new line of theirs—viz., by simply taking off the bonnet, the whole interior can be removed. Then, again, the "Quarturn" cock closes with the pressure and not against it. It is fuller in action, but operates with a quick thread.

Further particulars may be procured as to prices, etc., from The Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

NEW RETURN LINE VALVE

Until recent years the air valve, as well as the return valve, could be anything in the shape of a valve. The main idea was lots of radiation, lots of pitch on piping; but valves all a secondary consideration.

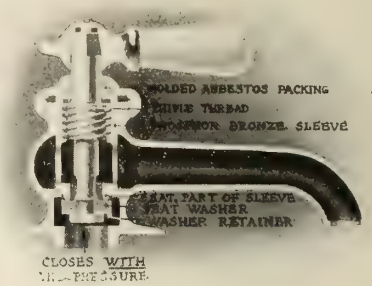
To-day things have changed; and, while it is very essential to provide ample radiation and boiler, it has been proved very necessary to consider the air valve and the return line valve. One of the latest to be placed on the Canadian market is the No. 8 Hoffman return line valve; sectional view is shown on this page.

New Quarturn Basin Cock

Further particulars may be procured from the Hoffman Specialty Company, Chicago, Ill.

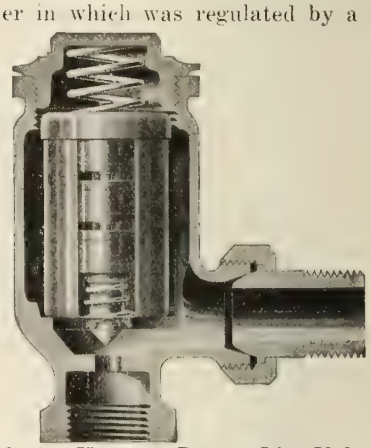
AUTOMATIC WATER BOWLS

Some time ago we published an article which showed how an automatic stock-watering system could be installed.



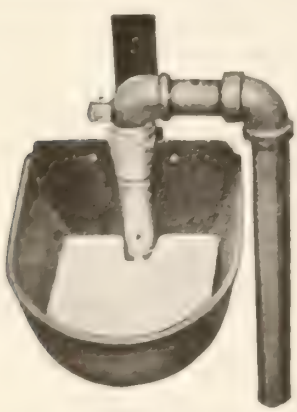
Sectional View of New Quarturn Basin Cock

The article described a system, the water in which was regulated by a ball



No. 8. Hoffman Return Line Valve.

(Continued on page 29.)



Bowl attached to steel stall. Showing method of installing for underground supply pipe.

Fine dairy stable fitted with water bowls using underfeed system.

Bowl attached to steel stall. Showing method of attaching for overhead water supply.

Practical Course for Sheet Metal Workers

ARTICLE No. 26 OF SERIES

By CHARLES SEIVERS

IN this article is shown further development of flange shown in plate 25. At A-B-C-D-E-F and G-H in Fig. 1 is shown the elevation of pipe, with roof flange and cone flange between the two.

At a point below the base line L-M and parallel to it, draw a line as N-O, and, on this line draw a circle of same diameter as base of cone at L-M, the centre of circle being placed at a point at right angles to the centre of the line L-M.

With the compass divide circumference of circle into a number of equal parts as shown by 1, 2, 3, 4, 5, 6, etc., draw lines at right angles to L-M from each of these points to the line L-M.

From each of these points on line L-M draw a line toward the apex of cone K, intersecting the line C-D. From each of the divisions on circle in plan draw lines to centre. The lines drawn from points on circumference to centre of circle show a plan of the lines drawn from L-M to apex of cone on elevation. To obtain the plan of opening on line C-D draw lines at right angles to N-O from each of the points of intersection on the line C-D, extending them until they intersect the corresponding line in the plan. The line from point C or 1 intersecting line from point 1 on plan, from point 2, intersecting point 2 on plan and repeating from remaining points in the same manner. A line drawn through the points obtained will give outline of plan view of opening on line C-D.

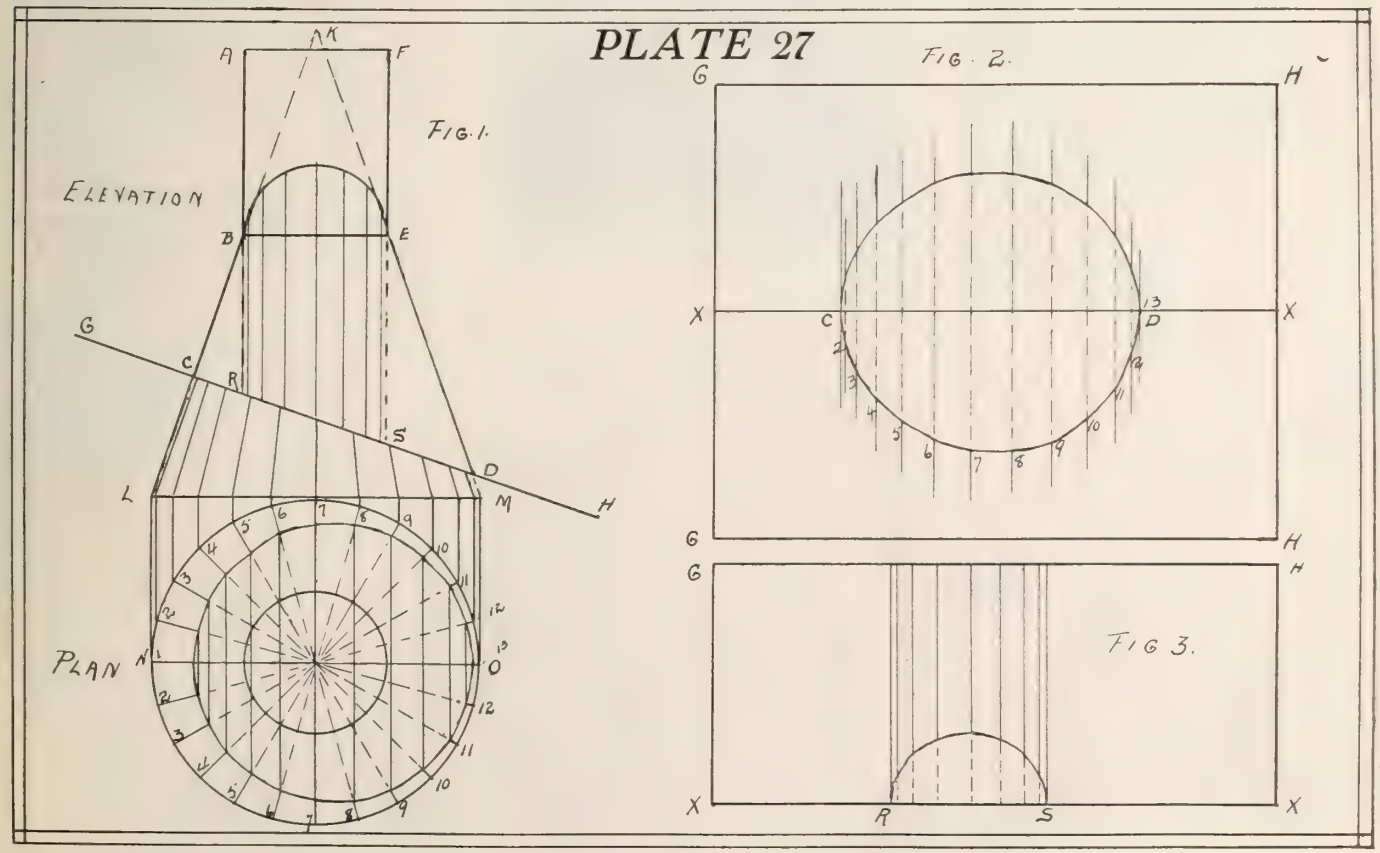
At Fig. 2 is shown the flat flange, G-G and H-H through the centre draw a line as X-X, on this line X-X mark off the spaces on the line between C-D of elevation, from each of these points draw lines at right angles to X-X as shown. The spaces just marked off on line X-X give the length of the opening on bottom of cone flange and of points between, the widths are shown on the plan of cone on line C-D. With compasses measure distance from line N-O on plan to the outline of plan on line C-D, marking the distance to point 2, on both sides of X-X on line 2, distance to point 3, on line 3, and repeating in same manner on remaining points 4, 5, 6, etc. A line drawn through the points obtained will give outline of opening in flat flange to receive cone.

In Fig. 3 is shown a half of the flat flange with opening for pipe only, the spaces from R to 5 on line C-D being marked off on centre line and the distance from B-E to each of the points in half section being set off on their corresponding lines from line X-X. A line drawn through the points obtained give outline of opening. There must be seam allowance provided for.

Our readers will find that by developing these problems about 4 times the size given, they will not only be learning how to develop the patterns shown but will also gain considerable insight into the art of general pattern developing.

"Are you fond of horses or dogs?"

"What difference does that make?" exclaimed the timid man. "When I get into the company of a horse or a dog my entire interest is centred on the question of whether he is going to take a fancy or an aversion to me."—Washington Star.



GOSSIP OF THE TRADE

GIFTS TO EMPLOYEES

The H. Mueller Manufacturing Co., Sarnia, sent out Christmas gifts to all men previously in their employ who have joined the overseas forces. Tobacco, cigarettes, socks, and other things were sent to each man, whether in Canada or overseas, and in the case of British reservists, of whom there were several, considerable correspondence was necessary to locate them.

GIVEN GOLD WATCH

Mr. William E. Kitts, superintendent of the Steel and Radiation Co., Toronto, was presented with a handsome gold watch at his home, 100 Dovercourt Road, by about fifty employees of the firm. Mr. B. Flint, general foreman, made the presentation, after which a pleasant evening was spent.

W. L. HELLIWELL GOES TO MONTREAL

W. L. Helliwell, who for eight years has been the Winnipeg manager of the Gurney Northwest Foundry Co., has received the appointment of manager of the Gurney-Massey Co., Montreal, and left on Saturday last to assume his new duties. Mr. Helliwell was the guest at a dinner given in the Fort Garry Hotel, Winnipeg, Wednesday, Dec. 15, by the directors of the Canadian Credit Men's Association, of which body he was president. He was presented with the gavel used during his term of office, mounted with a silver inscription. He was also the recipient of a handsomely framed photograph of himself, and his picture is being placed in the head office of the association. Mr. Helliwell was one of the original members of the Canadian Credit Men's Association. He is succeeded as president by L. J. Mylius, Winnipeg manager of the National Drug and Chemical Co.

"JUST PASSED ON"

[illegible] treasurer of the Dominion Radiator Company, died [illegible] Christmas morning.

Mr. Shenstone died at his home in Wychwood Park. He was a woodsman and a lover of nature. Near his house he had a pen of wild ducks, and on Christmas morning one obtained its freedom. Helping to round it up, he was seized with dizziness, fell over, and expired almost immediately. He had not been entirely well for some months, but didn't take any notice of his indisposition.

Mr. Shenstone was 37 years of age, was born in the city of Brantford, Ont., and was a son of Mr. Joseph N. Shenstone, treasurer of the Massey-Harris

W. L. HELLIWELL

who is leaving Winnipeg to become manager of the Gurney-Massey Co., Montreal, Que.

Company, who lives at 40 Walmer road. He was educated at Huron street school and Harbord Collegiate, later entering the University of Toronto and graduating from there in 1900. He was president of the University Cricket Club and Press Club while active at the University, and was a member of the champion junior Rugby team. Mr. Shenstone was also a member of the Yacht Club Home Guard. For some time after he graduated the late Mr. Shenstone resided in Chicago, where he was manager of a large printing plant. Returning to Toronto, he became treasurer of the Dominion Radiator Company, which position he held at the time of his death. He was looked upon as one of the city's rising business men, and was a staunch supporter of the temperance movement.

J. KNOX LINDSAY

Death came suddenly to Mr. John Knox Lindsay, financial manager of the Consolidated Rubber Company, at his home, Dec. 26 last. Mr. Lindsay, who lived at 104 Albany avenue, had been prominent in the shoe and rubber business for many years, and some time ago took his responsible position with the Consolidated Rubber Company, Montreal and Toronto. Mr. Lindsay suffered an attack of the heart, accompanied with a broken blood vessel in the leg, about a month ago, but had so far recovered that for several days he had been able to give his attention to his work. It was only on the day before Christmas that he complained of not feeling well, and went to his home again.

The late Mr. Lindsay was born in Newry, County Down, Ireland, 62 years ago, and was brought to this country when quite young. For many years he remained in Montreal, being connected with the Fogarty Shoe Company. After leaving that position he became treasurer of the John King Company of Toronto, and ten years later on, he formed the rubber firm of Robinson & Lindsay. He was connected with this company for seven years, before taking his position with the Consolidated Rubber Company.

IN TRAINING FOR OVERSEAS

Mr. T. W. Merian, formerly the representative in Ontario for the H. Mueller Mfg. Co., Sarnia, has enlisted for overseas, and is now in training at Calgary.

Quite a number of the Mueller staff have done likewise. Let us hope they will return safe, sound and soon.

BULLDOG SANITARY WOODWORK

Above is the title of a very interesting catalogue describing the products of Messrs. Howd & Co., London.

Various styles of w.c. seats and tanks are shown.

The catalogue may be procured by writing to above address for same.

Toronto Society of Sanitary Engineers Hold Meeting

The Most Important Question Taken Up Being That of Technical Education —Report of Educational Committee Received

NO problem to date is receiving more thought than is that of technical education. Millions of dollars are being expended with the sole aim of making the artisan more efficient in every line of work.

Progress depends upon technical education more to-day than ever before in the history of man.

Labor is becoming more costly; time is more valuable; and, while the 20th century has worked wonders and greater progress has been made along all lines, such progress would have been far more rapid had it not been for the lack of technical education.

There will be still greater progress made within the next twenty-five years than has been made during the past fifty years, and that is saying quite a lot. And whatever progress is made, it will be with less effort than in times gone by.

Sanitary and heating engineers have realized this more than any other class of artisans, because of the fact that plumbers were until very recently looked upon in much the same light as second-rate tinkers.

Such, however, is not the case to-day. The following report will go to prove that the committee appointed by the Toronto Domestic Sanitary Engineers' Society to look into the educational department have not allowed the grass to grow under their feet.

Geo. Clapperton, the chairman of the educational committee, read the following report at a meeting of the society held recently:

Report of Educational Committee Regarding Technical School, Toronto

Your committee have, for the last year or so been working in conjunction with the officials and steamfitters' classes. Your committee have given a great deal of thought to this work, and have no hesitation in saying that they believe their efforts will be very successful; they believe that the school will be of great service and benefit to the boys who wish to follow the trade of plumbing and heating.

Your committee interviewed the wholesale houses, and were very kindly received. They are glad to report that the Standard Ideal Co., Port Hope; the Standard Sanitary Co., Toronto; the Jas. Robertson Co., Toronto, and the J. L. Mott Co., Montreal, gave, freely and willingly, plumbing fixtures of the several different kinds. The firm of Page Hersey Iron Tube & Lead Co., Montreal rolling mills, gave willingly of their product—namely, iron pipe. It was very gratifying to your committee to find the interest that these manufacturers' and supply houses took in the matter, and in the future of our boys, and with such hearty co-operation and encouragement we feel the future for this matter gives much promise of great success.

We are glad to report that the night classes have now been put in operation, and that John E. Fullerton, who was recommended by the association, is the head teacher, and we are confident, after looking over his work since he has taken active charge, that he will make a success of it, not only for his ability to give the boys the practical side of this work, but the theoretical as well.

The above is only a short synopsis of the work of your committee. The following notes have received much more attention and thought than the equipping of the room for these classes, to which a great deal of time and attention was given.

We have in our association sixty or seventy members, each one employing a greater or smaller number of boys. Your committee felt that for the practical end, each member was well fitted to demonstrate to his boys, but we doubted if there were any in the association who were able to demonstrate the technical end of the business.

No doubt each member of the association feels with the committee, that the better we can equip the boy, the better business man he will become. He will be a man that it will be an honor for anyone to compete with in business; therefore, we ask the association to consider the proposal of allowing the boys in their employ one or two afternoons per week to leave their work and attend the Technical School, and receive the technical education which we are so anxious that each boy should receive.

Our idea is that the boy, from the time he starts in to learn the business until his three years are up, should have an afternoon or two off each week, and after he has been three years at the business he would then have to take his further education at night, as there will be night classes, formed as at present, to carry his education to completion.

It should be ascertained just about how many boys there would be to send to the school, and what afternoons would be most suitable to the members, when the matter could be taken up with the management of the school, and it could be seen what arrangements could be made for these classes. Dr. McKay, the principal of the school, promised the committee that he would do everything in his power to make it interesting for our boys, and give them every opportunity for carrying on their studies; and with the facilities that they would have of becoming technically and practically trained men, we feel that not only will we have better mechanics to carry on our work, but the trade as a whole will assume a much higher standard of perfection than is possible at present.

When your committee met Dr. McKay, principal of the school, and heard him express his views on technical education, we realized more fully what the business men in our trade have missed. Had we received the technical education such as we hope the boys will receive now, we would have been better business men, more fully equipped, and more capable of accomplishing much greater work than we can to-day, and at a smaller cost of energy and time.

We would ask that this be brought up at the earliest moment, so that we may have our classes put in operation early in the year.

Yours respectfully,

WILLIAM MANSELL.
(Signed) LEWIS LEGROW,
GEORGE CLAPPERTON,
Committee.

HEAT GENERATOR

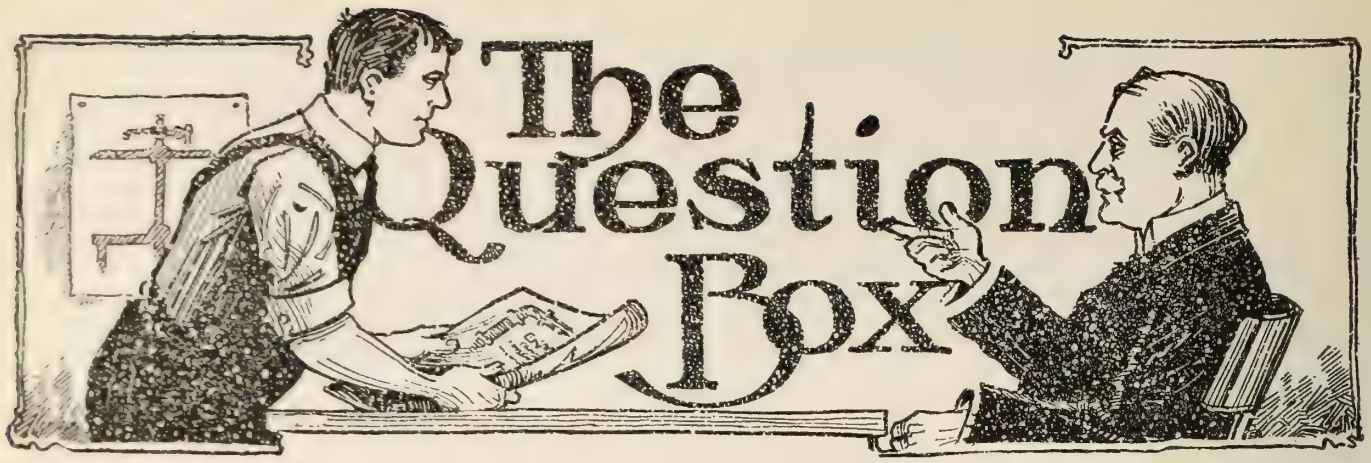
A booklet describing the "Knickerbocker" heat generator made by the James Morrison Brass Mfg. Co., Toronto. This appliance, which is designed for hot water heating systems, is illustrated and described, the illustrations including a number of diagrams of heating systems showing location of the generator. The method of installing the generator is described and also the benefits to be derived from its use.

NEW SANITARY AND HEATING GOODS

(Continued from page 26.)

cock and tank, and as the cattle took a drink the water was furnished from this tank. Below is shown another method by which the water may be furnished either from an elevated tank or from a pneumatic water system. These bowls are known as the "Acorn" automatic Water Bowls for cows and horses. A plate is placed a few inches from the bottom of the bowl which, when the cow or horse presses down the plate as it takes a drink, operates a valve. The three cuts on this page describe fairly well the various methods adopted in constructing these bowls.

Further particulars may be procured on application from The Metal Shingle & Siding Co., Ltd., Preston, Ontario.



Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

A PIPE TERMINAL PROBLEM

Editor The Sanitary Engineer:

I note that you place a lot of importance upon the question of soil and vent pipe terminals.

Will you please show how you would cope with the following trouble. A couple of winters ago I was called upon to open up several stacks which had become choked solid with ice, hoar frost, or whatever you may term it, and in one case the plug of ice fell down until it came to the place where the increaser had been placed. I've no idea why this job was installed in this way. (See sketch attached), All I know was that I had to get into a very awkward hole to get at the plug of ice and melt it.

I did not like to leave the stack plugs because many of the traps broke their seal every time the fixture was used. Could you suggest how it would be possible to prevent the ice plug completely blocking up the vent?

Pipe Terminal, Que.

It is interesting to receive an inquiry about pipe terminals, this being as far as the writer can remember, the first question in over two years.

The sketch submitted by our correspondent is shown herewith in Fig. 1.

It will be seen that for no apparent reason the increaser was placed too low down the stack, and when the plug of ice dropped it would naturally be quite a distance down the stack, and only melting would remove it, this, too, would be a tedious, and cold job, and would not prevent the possibility of having to go back every time a collection of ice or hoar frost began to cause trouble.

In the first place if our correspondent will note the article on pipe terminals in Dec. 1st issue, he will see a roof terminal which could not possible give such trouble. But, seeing that it might very likely clash with the local plumbing by-laws to install a terminal, the next best solution is—as shown. The trouble would be to install any future soil or vent pipe terminals as shown in Fig. 2.

It will be seen that unless the ice plug be more than one foot long, it could not deprive the traps of their vent. The portion on the stack where the vent is connected, being above the point where the increaser is connected, and where certain pipe terminals are causing trouble, it would be the least expense in the long run to have the change made. Editor.

HOW CAN MARBLE SLABS BE CLEANED?

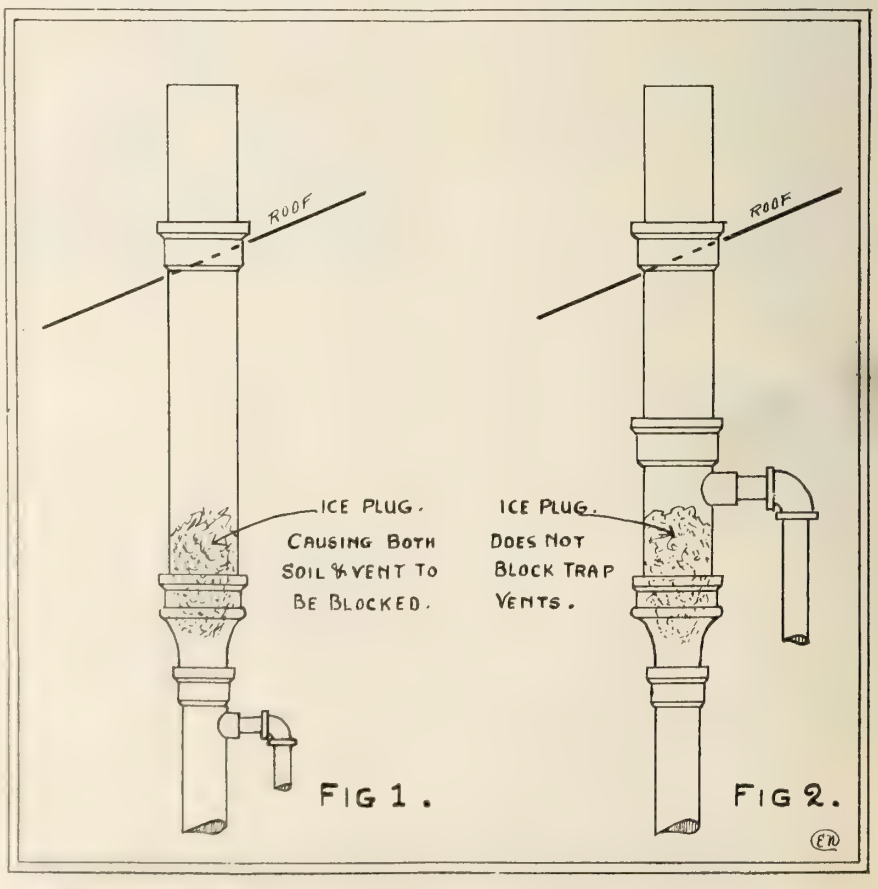
Editor The Sanitary Engineer:

I have been asked to clean a large number of marble slabs by one of my customers, and am not quite sure how this can be done so as to make a good job. Can you give me any information, if possible, in your next issue?—O. M. S.

Make a paste up of the following ingredients by measure: Two parts soda, one part powdered pumice stone, and one part powdered chalk. Rub the marble well and wash off with soap and water.

If the marble is greasy in spots, make up a thin paste of Fuller's earth and benzine, and cover the greasy parts with the mixture, and allow to stand for about ½ hour. Then wash off.—Editor.

(Continued on page 32.)



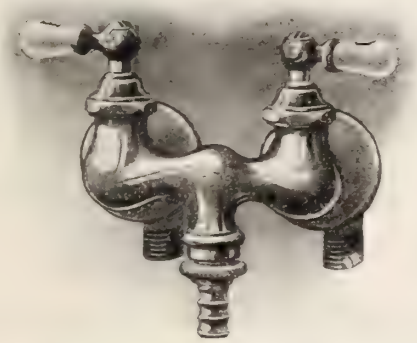
ARE YOU BUYING FOR PRICE ?

IF YOU ARE, YOU CANNOT COMMAND QUALITY

No line of brass goods require to be as dependable as those which go into the bathroom. Many a low-priced bath-cock has cost from $50.00 to $100.00 in damages and water waste.

We have to maintain our price to ensure quality. Every dollar we have is behind the goods we sell.

MUELLER



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QUALITY FIRST IS OUR CHIEF AIM

One of our Customers said :

"MY father and I have been in the plumbing business over 25 years and our biggest losses have been caused by troubles with inferior brass goods.

"We are building up a splendid business on quality brass goods Every dollar we spend with Mueller's is like putting money into the bank with compound interest.

"WE NEVER HAVE TO GO BACK TO REPAIR MUELLER RAPIDACS."

"The Quick-Acting Compression"

H. Mueller Manufacturing Co., Limited

SARNIA, ONTARIO

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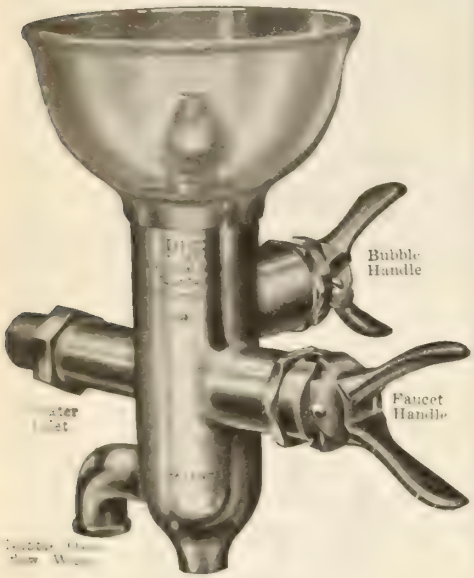
(MADE IN CANADA)



Actual Size of Bowl

Stop That Waste of Water

Puro saves 35% of that wasted water.
Puro does away with the old-fashioned unsanitary tin-cup; it is the Safety Sign of pure water
Employees like it because it is clean—because it insures a clean, fresh drink—because it saves their time.
The Puro Sanitary Drinking Foutain has a positive control that eliminates spurting.
An excellent investment—for shop and office
We'll make you a complete estimate on an installation—we will also make you a special proposition for a try-out in any one department.

"PURO-FY" Your Water Supply

Puro Sanitary Drinking Fountain Company

SAFETY FIRST PURO ECONOMY ALWAYS

147 University Ave., TORONTO, CAN.

Consulting Sanitary Engineer

Advice and Plans on Water Supply and Sewage Disposal for Residences, Factories, etc.

H. L. SEYMOUR, B. A. Sc., A. M. Can. Soc. C. E.

BOX 95 SANITARY ENGINEER TORONTO

A want ad. in this paper will bring replies from all parts of Canada.

THE QUESTION BOX

(Continued from page 30.)

TO COVER WARM PIPES

Editor The Sanitary Engineer:

Is there any kind of pliable pipe covering to cover hot air furnace pipes other than the asbestos paper usually pasted on? I've a customer who has a two-year lease on a house and he wishes me to cover his furnace pipes, but does not like the idea of leaving the asbestos on after he leaves.

Procure corrugated asbestos air cell pipe covering. It can be bought by the roll. Wrap one ply round the pipe and tie on with wire. For the elbows, take the metal pattern of the pipe and cut the asbestos same shape as pattern, and about half an inch less in width, so as to prevent the air cell paper from overlapping at the joints. These pieces, too, can be wired on with stove pipe wire.

This material can be easily removed, and will be easily placed on same size of furnace pipes. Editor.

PNEUMATIC WATER STORAGE AND SUPPLY

(Continued from page 17.)

$$(M+15) = (T+P) \times \frac{V}{A}$$

$$(M+15) = (15+191\tfrac{1}{2}) \times \frac{43\tfrac{1}{2}}{33\tfrac{1}{2}}$$

$$34\tfrac{1}{2} \times \frac{43\tfrac{1}{2}}{33\tfrac{1}{2}} = 45 \text{ lbs. absolute or } 30 \text{ lbs. gauge pressure.}$$

It will be observed here that there is a great difference in the maximum pressure—in Case I it is 88½ lbs. and Case II, 30 lbs.—which at first sight is a serious item, because water must be pumped into the tank at pressures ranging from 19½ to 88½ lbs. and from 19½ to 30 lbs. respectively.

The next point is the available storage capacity in each case. Each building must be considered by itself and the storage required depends upon the quantity of water required per day and per hour, and also upon the method of pumping. We will assume that 200 gallons per day are necessary and that about one-fourth of this quantity is consumed in one hour, namely, 50 gallons.

If the pumping is done by manual labor or by gasoline engine, pumping will probably be done once a day, but where electric motors can be used pumping will then be done at frequent intervals; the motor being switched on and off according to the pressure, and therefore as the storage is depleted or replenished sufficiently.

The formula to ascertain the available storage of water will be considered in the next article.

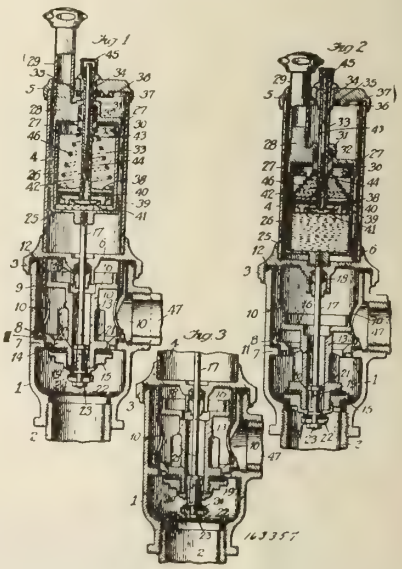
NEW CANADIAN PATENTS

No. 163,357—Flushing Valve

Robert A. Brooks, Chicago, Illinois, U.S. A., 22nd June, 1915; 6 years. Filed 15th March, 1915. Receipt No. 249,128.

Claim.—1. In a device of the character described, a differential main valve having two pressure areas of different sizes, the one of preponderant pressure constituting an inlet valve and being normally maintained seated by inlet pressure, and a relief valve controlling the admission of water under pressure to the other pressure area of the main valve, said relief valve having a limited relative movement with respect to the main valve and acting to unseat such valve mechanically at the end of its relative downward movement.

2. In a device of the character described, and in combination with means for operating the relief valve, automatic



means for closing such valve slowly, a main valve having a passage through its body and formed with a valve seat at the lower end of such passage and also having a block portion arranged to close the main valve opening in advance of the seating of the valve, a relief valve cooperating with said valve seat at the bottom of the passage through the main valve and arranged to carry said main valve towards its seat as said relief valve closes, said main valve having a limited free movement with respect to said relief valve, whereby said main valve will seat suddenly in advance of the relief valve when the block portion of the main valve closes the main valve opening, and a limited closing flow of water will occur through the relief valve.

LAMPBLACK

Lampblack is the soot or carbon deposit obtained from burning substances, such as resin, petroleum, tar, etc., rich in carbon. Little oxygen is allowed to reach the flame, so that it becomes smoky, and the soot is caught upon some cooler surface.

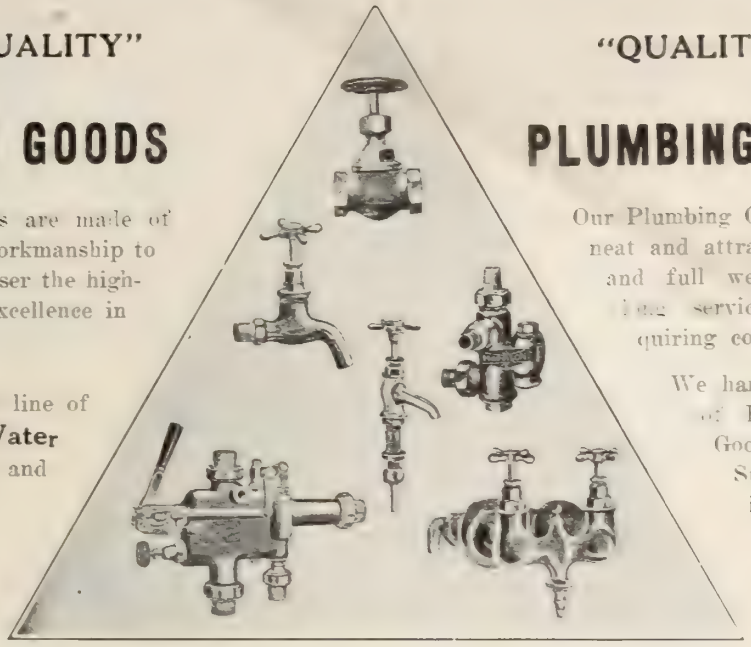
"QUALITY"

STEAM GOODS

Our products are made of materials and workmanship to insure for the user the highest degree of excellence in service.

We make a full line of **Steam and Water Goods** in Brass and Iron.

Locomotive and Marine Brass Work



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PLUMBING GOODS

Our Plumbing Goods are made neat and attractive in design and full weight to insure long service, without requiring continual repairs.

We handle a full line of Enamelled Iron Goods and Sanitary Supplies for use in modern building construction.

The **James Morrison Brass Mfg. Co.** Limited, 93-97 Adelaide St. W., TORONTO

Our Mixed Metal Sales Amount to Over $5,000,000 Annually

HOYT'S A STRICTLY SOLDER

We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO

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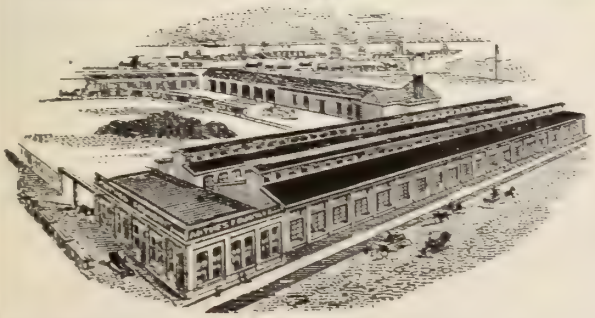
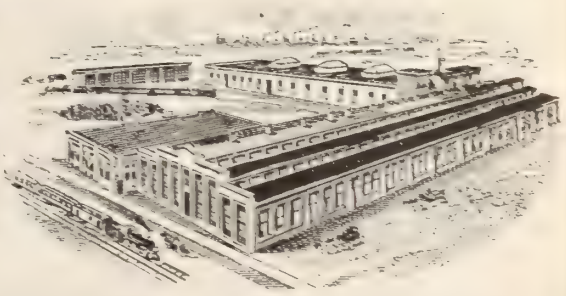


MANUFACTURERS OF

CAST IRON SOIL PIPE AND FITTINGS



ALPHABETICAL LIST OF ADVERTISERS

Occasionally advertisements are inserted in the paper after the index has been printed. The insertion of the Advertiser's name in this index is not part of the advertising order. The index is inserted solely for the convenience of the readers of the paper.

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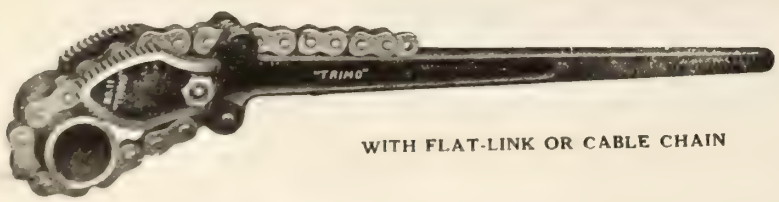
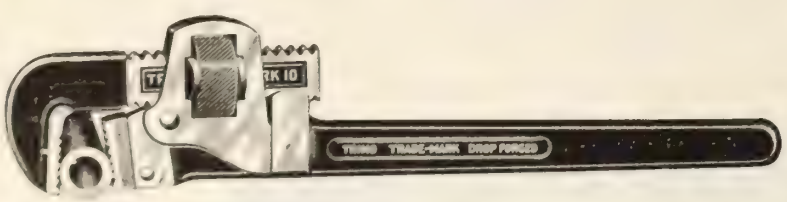


WITH FLAT-LINK OR CABLE CHAIN



TOOLS

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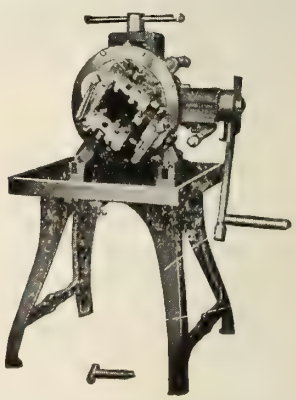
TRIMONT MFG. CO., 55 Amory Street, Roxbury, Mass., U.S.A.



No. 00

PIPE MACHINES

Either Hand or Power

This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
A time and labor saving machine.

Manufactured by

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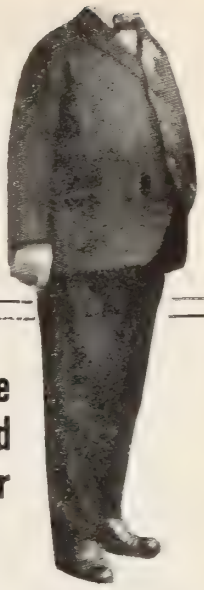

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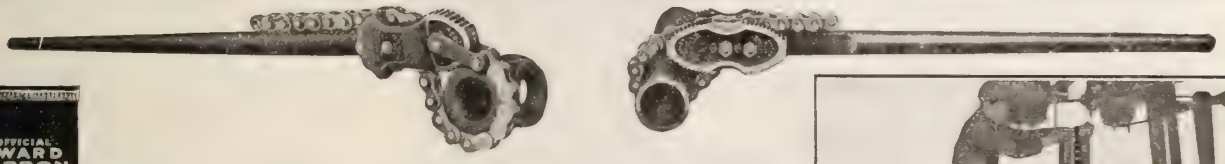

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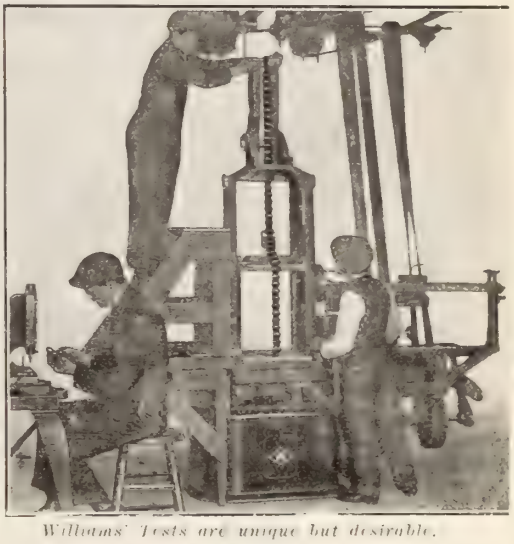

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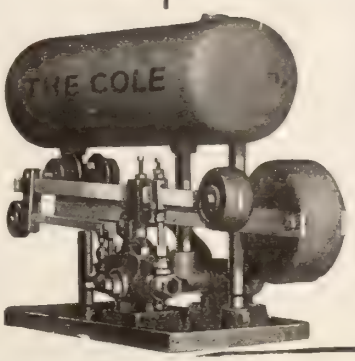

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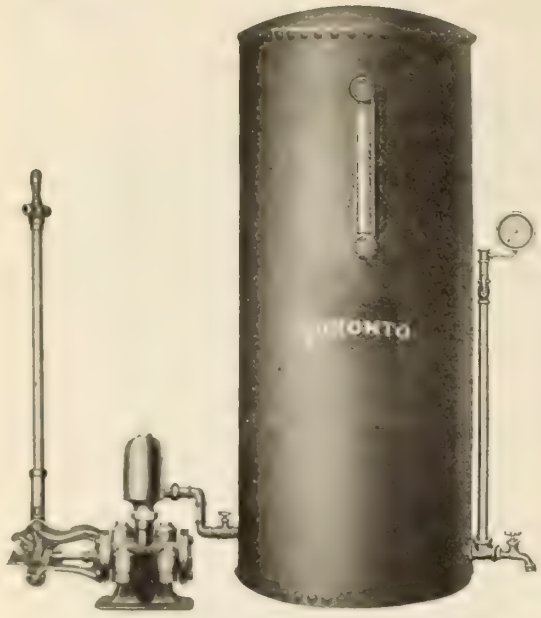

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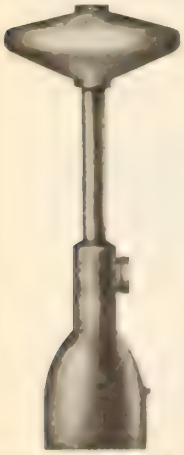

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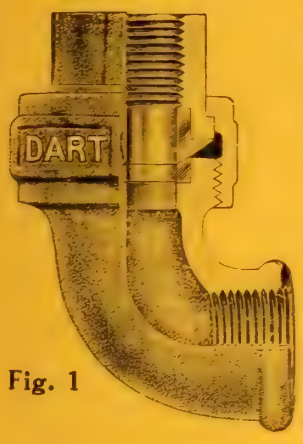

Fig. 1

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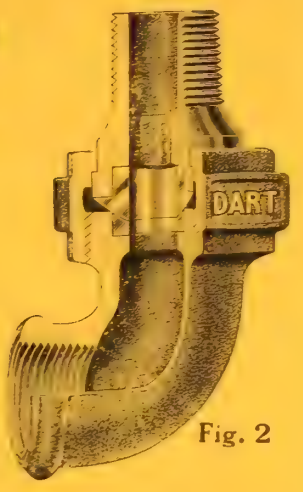

Fig. 2

By the use of Figure 1 you save two threads, do neater work and make sure that the connection is trouble-proof.

Figure 2 is a 4-in-1 fitting. It cuts out nipple and one thread at running end and nipple, elbow and two threads at the elbow end.

Sold by all jobbers

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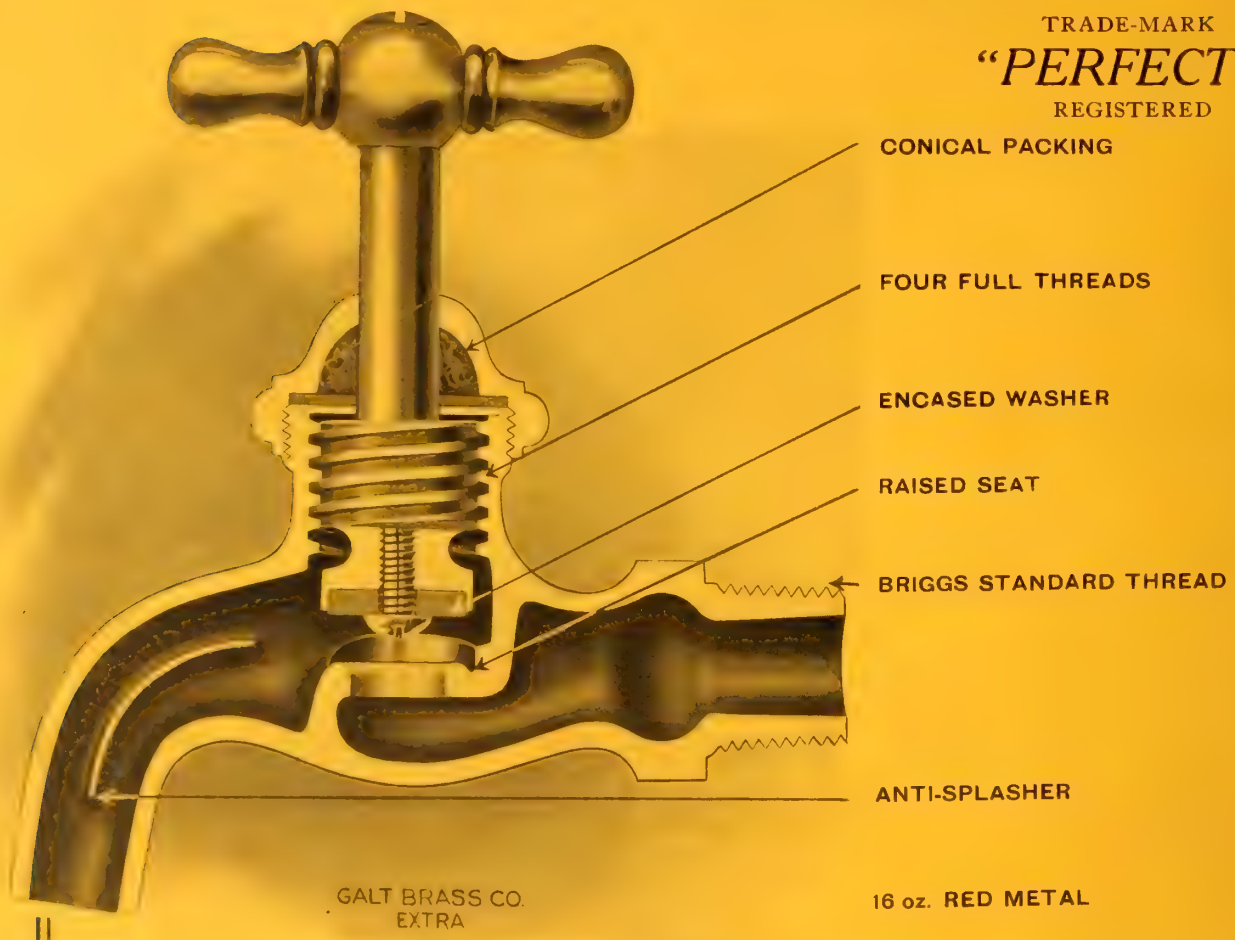

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The same features are also embodied in all our Bath, Basin and Sink Cocks.

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Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER

PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

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The Standard Ideal Company Limited

General Offices and Factories: Port Hope, Canada

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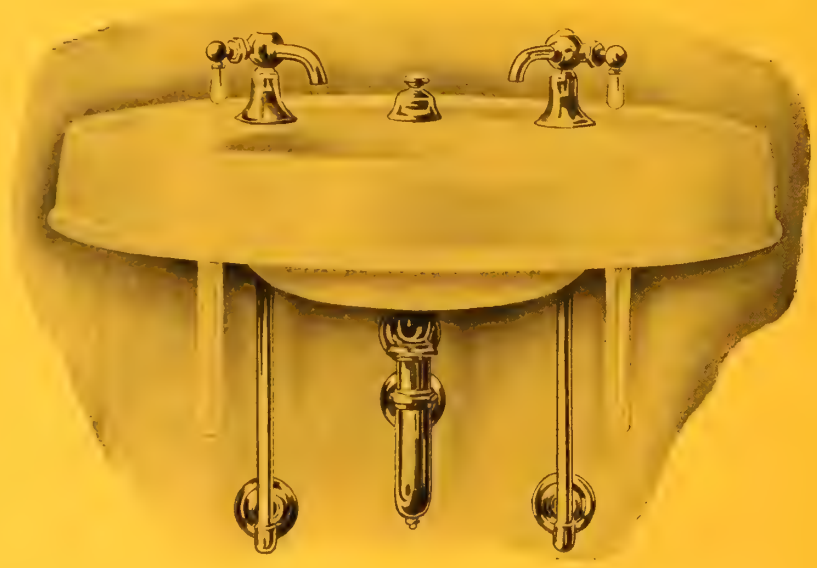

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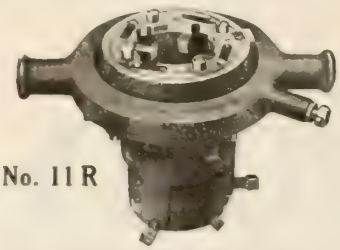

No. 11 R

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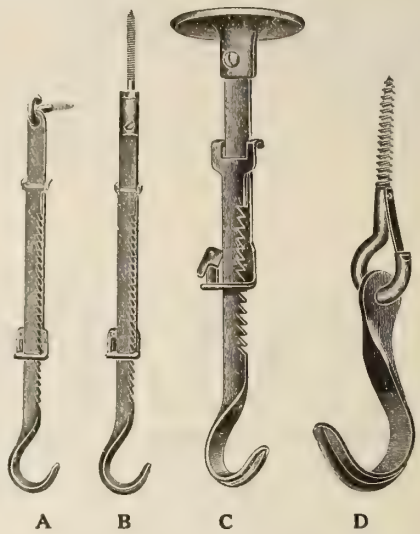

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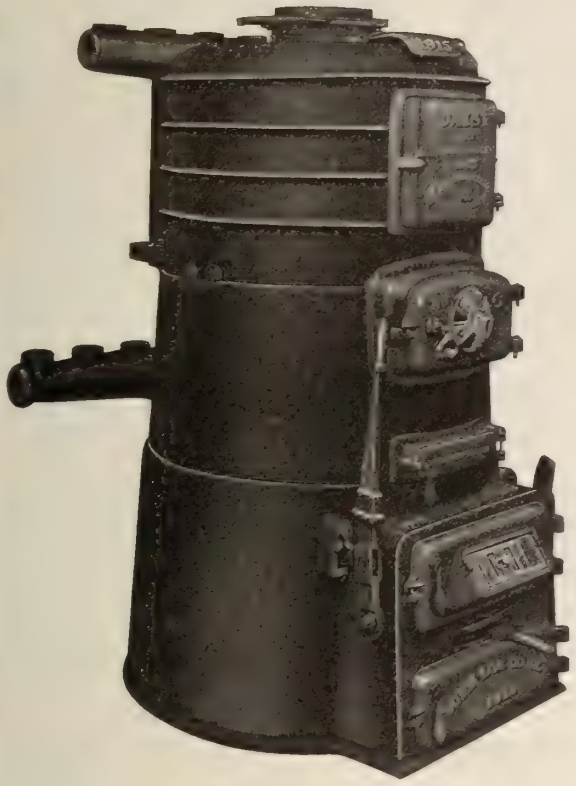

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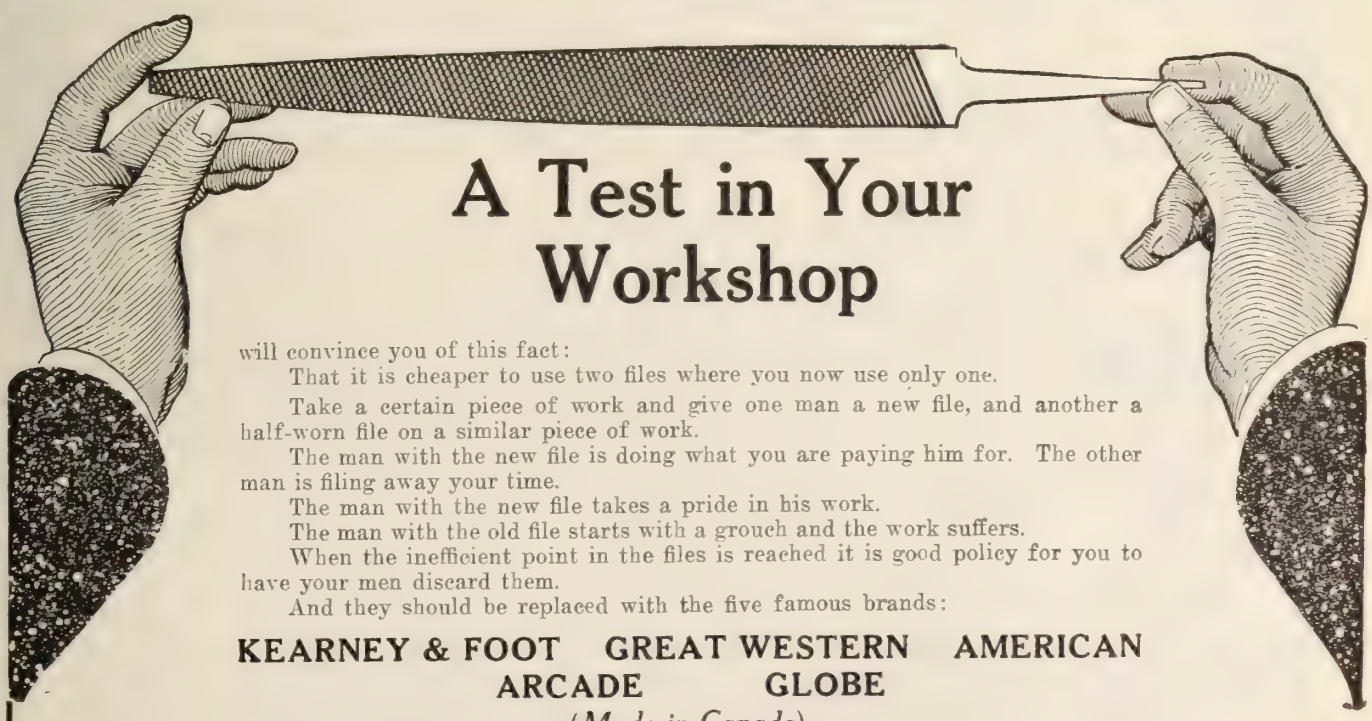

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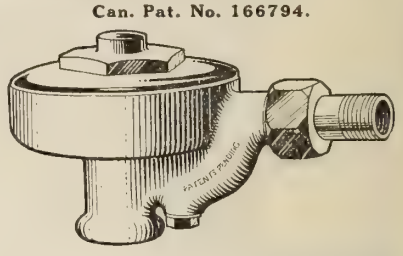

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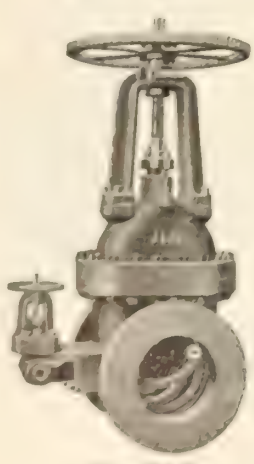

Fig. 294-B

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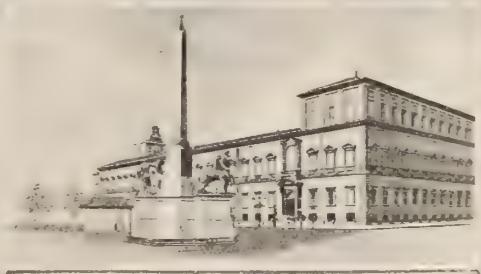

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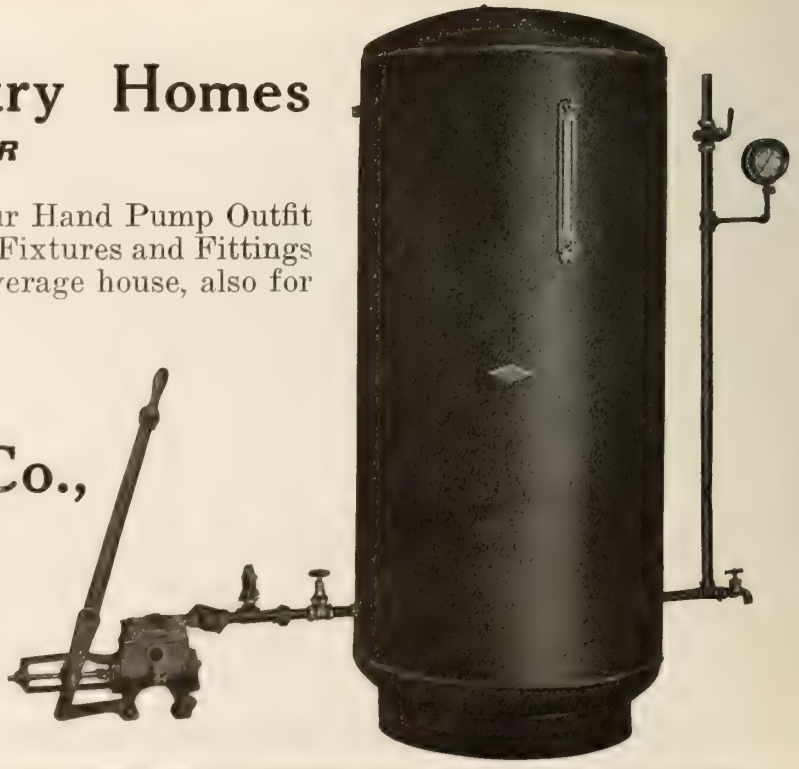

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In 1912 we installed two (2) 16" Presto Heaters, one of which was to replace two (2) 24" heaters of another make which were being used to heat the old University Building. The other one was connected to supply domestic hot water.

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Yours very truly,

(Signed) A. McGowan, O.M.I.,
Bursar, University of Ottawa."

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SANITARY ENGINEER

PLUMBER and STEAMFITTER of CANADA

Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, JANUARY 15, 1916 No. 2

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EDITORIALS

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THE SANITARY ENGINEER

VOL. X. JANUARY 15, 1916 No. 2

Importance of Proper Ventilation

Temperature Can be Lowered if Proper Humidity is Maintained. Quite a Number of Humidifiers Are on the Market, the Sale of Which Would Prove Mutually Profitable to Buyer and Seller

THE question "What is a proper temperature for a living room?" is frequently asked. 70° F. has been accepted for years as the most desirable. This has of late been reduced to 68° and by some to 65°, and in England 60° is generally adopted. With a humidity of not less than 50 parts, a temperature of 65° would no doubt be high enough. However, experiments are being made in New York, Boston and other large cities, to determine whether or not the temperature may be lowered to 65° or even 60°.

Chemical Composition of the Air is of Minor Importance

It has been amply demonstrated that the chemical composition of the air is of little significance from a health standpoint. We need not worry about the excess of carbonic acid gas or of organic matter in the air, as it is rarely likely to contain sufficient to be particularly injurious. The things we require to concern ourselves most about are: the proper temperature, say, 68°; the proper humidity, say, 50°, and a sufficient movement or current—in other words, proper atmospheric conditions.

The normal out-door air contains from 65 per cent. to 75 per cent. of moisture, but if you pass this through a hot air furnace, by the time it reaches our living rooms it will not contain more than probably 30 per cent. to 40 per cent. of moisture. The same is, for the most part, true in houses heated by hot water and steam where no provision is made for supplying moisture. The result is, that this dried-out air craves moisture, and will take it up from all surrounding bodies, from our skin, from the mucous membrane of our mouth, nose and throat. This is in a large measure responsible for the dry, hacking laryngeal cough so prevalent in winter; for the aggravation—if not the production—of much of our catarrhal conditions; for the irritability, restlessness and sleeplessness from which people suffer in these improperly heated and ventilated homes.

Furthermore, from an economic standpoint, insufficient moisture, or humidity, in our homes is very extravagant, for very dry air requires a higher temperature to produce the same sensation of warmth and comfort than does an atmosphere with a proper percentage of moisture. It has been estimated that from 10 per cent. to 15 per cent. of our fuel is wasted in over-heating rooms, due to the improper amount of humidity. To overcome this dryness, small reservoirs for heating water have been attached to the furnaces, but these are rarely kept full—and even when they are, they are not at all adequate. For instance, air at 25° F., which means 7° of frost, even if saturated with moisture, when heated to 70° would require the addition of one-half pint of water to every 1,000 cubic feet to give it a humidity or moisture of 65 per cent., which is practically normal.

Some conception of the amount of moisture required, and how far the air in our homes, schools, factories, etc., falls short of it, can be had from the following description of the precautions taken by a large industry in the United States with a capacity of 450,000 cubic feet, and a day population of 450 persons: The fresh air, which is distributed by a mechanical system, is drawn into the building at the rate of 26,000 cubic feet every minute and has moisture added so as to contain about 50 per cent. of relative humidity. To secure this condition, 675 gallons of water—in the form of steam—are mixed with the air in ten hours, or about one and a half barrels per hour. Certain parts of the building, which had been heated with difficulty before, are now made more comfortable, and in the whole building 3° less heat is required to maintain a comfortable temperature. There has been a noticeable absence of coughs during the winter among the employees.

Use a Humifier

Various humifiers (instruments for supplying a proper amount of moisture) have been suggested, of which a very efficient and simple one is the exposing of the air from a register or radiator to moisture by having it passed through a surface of cotton wick, the same material that is used in lamps, only very much wider. One end of this wick is submerged in a reservoir, or vessel, containing water, which is attached to the radiator. This reservoir can be constructed out of galvanized iron or other material and suspended against the posterior surface of the radiator—that is, between the radiator and the wall, and the wick allowed to lie over the top of the radiator. It has been demonstrated that by means of this simple contrivance the relative humidity of a room can be kept between 65° and 60° F. by evaporating about four and a half quarts per day, and a temperature of 65° so maintained is as comfortable as one of 70° in a dry atmosphere and much less irritating to the mucous membrane.

A very practical illustration of this is the fact that we can sit and read in comfort on our porches or in our gardens in a temperature of from 60° to 65° in a summer evening having a normal humidity, while the same temperature in our homes in the winter with a dry atmosphere would be very uncomfortable, owing to the more rapid evaporation of moisture from the surface of our bodies in this drier atmosphere.

The necessity, therefore, for provision for a proper degree of moisture in the atmosphere of our living rooms is quite apparent. It must be remembered, however, that excessive humidity which only occurs under certain factory conditions is quite as undesirable and, in some instances, even more enervating than insufficient humidity.

It is rather surprising that heating and ventilation engineers have not placed more stress on the necessity for cooling plants for the summer, as a temperature of over 72° with a relatively high humidity is undesirable from a health standpoint. In some places the plants used for heating have been so constructed that they can also be utilized for cooling purposes in the summer time. We presume that the cost of the installing and operating of cooling plants would make them prohibitive in most cases, but the necessity exists nevertheless.

Open Windows for Ventilation

The three essentials of ventilation: moisture, temperature and current—or movement—can best be secured by the cross ventilation effected by open windows. Thus far the open window seems to be the most practical method of ventilation: it is available to all and costs nothing for installation.

AMOUNT OF HUMIDITY OBTAINED WITH AIR MOISTENER

The recent discussion as to whether any of the warm air furnaces now on the market are equipped with air moistening devices that will fulfill the requirements of maintaining 40 per cent. to 50 per cent. at 70 degs. F. indoors when the entering air is at 32 degs. F. and 25 per cent. saturated has brought out some interesting facts regarding the Filtros air moistener, made by the General Filtration Company, Inc., of Rochester, N.Y. This moistener, although applicable to furnace heating systems, is adaptable to any type of system.

The relative humidity that is obtained with the Filtros air moistener, it is stated, depends entirely upon the number of separate moistener units that are installed. In this respect the system is similar to that of the Air Moistener Co., of Chicago (Steamo air moistener), and of the Savo Mfg. Co., Chicago (Savo air moistener). If a sufficient number of units are placed in the heating apparatus, a relative humidity of from 40 per cent. to 50 per cent. at 70 degs. F., can be maintained under all outside weather conditions down to a minimum outside temperature of from 5 degs. to 10 degs.

The General Filtration Company calls attention to the fact that the relative humidity of the outside air is not so important a factor as might at first be supposed, because with all temperatures ranging from 72 degs. down to zero and below zero, the total moisture contained in the air is so limited, as compared with temperatures ranging from 60 degs. up, that the humidity at the lower temperatures is more or less negligible.

An interesting statement made by this company is that in direct and indirect steam and hot water heating, approximately one-third greater area of the Filtros air moistener is required to maintain a given humidity than in warm air furnace heating, the reason for this, as given, being that in the latter type of heating much more heat is encountered and consequently a more rapid evaporation. Heating and Ventilating Magazine.

In commenting upon the above it is well to understand the question of humidity a little more thoroughly than does the ordinary heating engineer. For instance, the writer called upon a certain heating engineer recently, and a customer happened to be speaking with him on this very subject. The customer had a hot water heating system and concluded that he would try a couple of pans behind two radiators, and said he "If I find any improvement I'll have one put behind every radiator."

The heating engineer replied, "Alright, I will send you a couple up."

The writer at once explained the futility of such a course, with the result that every radiator was fitted up with air moisteners.

This question of air moistening is of very vital importance, and air moisteners which will either inject moisture into the air, or give off moisture by evaporation are to be strongly recommended.

They are a specialty which if properly handled will result in benefits mutual both to the buyer and seller, but especially to the buyer who has them installed in his home.—Editor.

THE HEAT BALANCE OF THE HUMAN BODY

The question of temperature is perhaps one of the most important of any in connection with the question of ventilation. Human beings differ in their likes and dislikes, but in one thing they seem to be fairly constant and that is in the amount of heat they require. As between the Esquimo and the African negro, there does not exist a great difference in the amount of heat radiated in 24 hours. Human beings lose heat by convection and combustion in exactly the same way, so that the amount of heat required depends on the difference of temperature and the temperature of the surrounding air. These differences are taken care of by means of clothing. When a man wears clothing he is surrounded by a volume of air that does not diffuse so that the factor of convection and diffusion become less.

Now, the correct temperature at any place is a variable. It is a function of the natural temperature of the body and of the amount of clothing and condition of clothing at the time. When a man puts on clothing, he is modifying the law to the extent that he is modifying the amount of heat lost by convection and diffusion and increasing the amount of radiation, so that the total amount remains the same. There is one correct temperature and only one, but that is a constant which varies. It depends entirely on the clothing.

If, in the north, where people wear fur and cover large portions of their body, the outside temperature can be one thing, and in the south, where they cover less of their bodies, the temperature can be higher and the total amount of radiation from the bodies in each case will remain the same.

In order to maintain a fixed temperature in a room, the correct temperature having been decided as a result of taking into consideration the function of the clothing, there is one amount of air for a given temperature of entering air which will maintain a room at this fixed temperature. If the entering air is cold, a very small quantity is needed, because the amount of heat given off by the people is a constant. If, on the other hand, the temperature of the incoming air is high, a very large quantity will have to be brought in.

Throughout all this, there comes the question of humidity. Assuming that each human being gives off a certain quantity of heat in twenty-four hours and a certain definite quantity of moisture which does not vary, we can write an equation for the incoming air if we know the humidity, or if we know the temperature, for the humidity, so that those problems can be solved.

As I use the term, the problem of heating means simply this, that a human being gives off a certain amount of heat in 24 hours and a certain amount of moisture which is evaporated at a certain degree of latent heat of evaporization. Then you determine by the intermediary of clothing and, if necessary, artificial heat, what you require.—M. W. Franklin, before the Heating Engineers' Society.

Economisers—While but a short time ago, economisers were considered more as a refinement in power stations than an actual necessity, we find their real usefulness becoming more and more evident as practice changes. With the introduction of motor-driven auxiliaries, such as boiler feed, condenser and house service pumps, and the consequent reduction of available exhaust steam for feed water heating, and with the decrease in temperature of condenser discharge due to high vacuum, some means must be provided for the proper heating of the water before being introduced into the boilers. These conditions bring the economiser forward as more necessary as well as advantageous in actual service.

Standardization of Cast Iron Pipe and Fittings

One of the Many Problems Being Taken Up By The Canadian Institute of Sanitary Engineers. The Problem of Standarization of Soil Pipe and Fittings Will be Greatly Appreciated by Every Earnest Sanitary Engineer, Not Only in Canada, But Throughout the World

By William McFarlane, Secretary and Mem. C.I.S.E.

THE standardization of cast iron pipe and fittings is a subject which is of vital importance to all those who are interested in the progress of sanitary plumbing, and to my mind it has been more acutely important in the last few years to the plumbing fraternity of Western Canada, where, owing to the unprecedented growth of various cities with the accompanying exceptional demand for sanitary plumbing, it has been quite a problem to supply the demand for pipe and fittings with the result that on one job you might find material from a half-dozen different foundries with the usual difficulties arising therefrom of one manufacturer's material not fitting properly into the other's. Another difficulty met with and one that has called down anathema on the heads of those responsible is encountered in the caulking of joints where, owing to the short spigot ends on fittings it is hard to get the joint properly caulked in the throat of the bend or branch piece. The question has been asked over and over again, "Why does not someone get busy and get longer spigot ends on all fittings?" but, up to the present time it has gone no further than the asking of the question. However, interest has at last awakened on this matter and we hope it will grow until it is brought to a successful issue. One other point worthy of note and one which will be upheld by wholesale houses and jobbers is the large and varied stock which the present conditions make it necessary for them to carry, and which could be brought to a minimum by the standardization of all plumbing pipe and fittings, and to this end we in Western Canada mean to bend our energies.

The Canadian Institute of Sanitary Engineers have been working hard for the past two years in formulating a Uniform Plumbing Code, which with the exception of a few of the more complex sections is almost completed. One of these sections deals with the matter under consideration and as I chance to be a member of the committee working on this question and have spent quite a bit of time on it, I have been requested to give an account of the work done by our committee on this subject.

For the purpose of gathering some data for the work placed upon us, we as a committee visited the various wholesale supply houses taking notes of the various makes of pipes and fittings. In this way I may say we were disappointed, as we found that while each manufacturer's own make of pipe and fittings fitted fairly well, it was a difficult matter in some cases to combine one maker's material with another's, should the necessity to do so arise as it has done in the past.

Taking 4-in. pipe alone, we found it varying from 1-16th to ¼ of an inch less than 4 in. in diameter. In fittings we found quite a number where the body of the fitting was "Med." weight while the hub was of "Standard" weight. In another instance we found on comparing two T-Y branches, one marked "X-H" and the other "Med," the "Med" seemed to be the heavier of the two, and when placing the "Med" into the hub of the "X-H" we found a tighter joint than when we reversed them. Finding no assistance under these conditions we decided to work out our own sizes and in this connection we are indebted to the valuable assistance derived from a paper delivered by Mr. R. R. Rust at a convention of the American Society in Milwaukee in 1911.

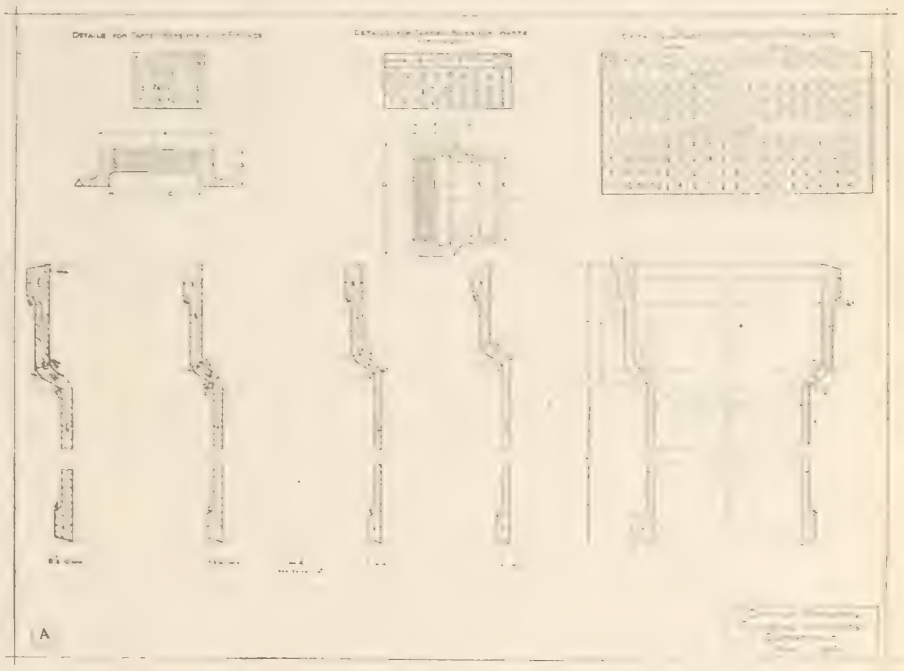
When discussing the subject there were several leading points we decided upon, viz.:

(1) A uniform lead space in all joints.

(2) A sufficient thickness of wall in hubs to resist caulking strain.

(3) T-Y branches as far as possible to be on the T and Y principle.

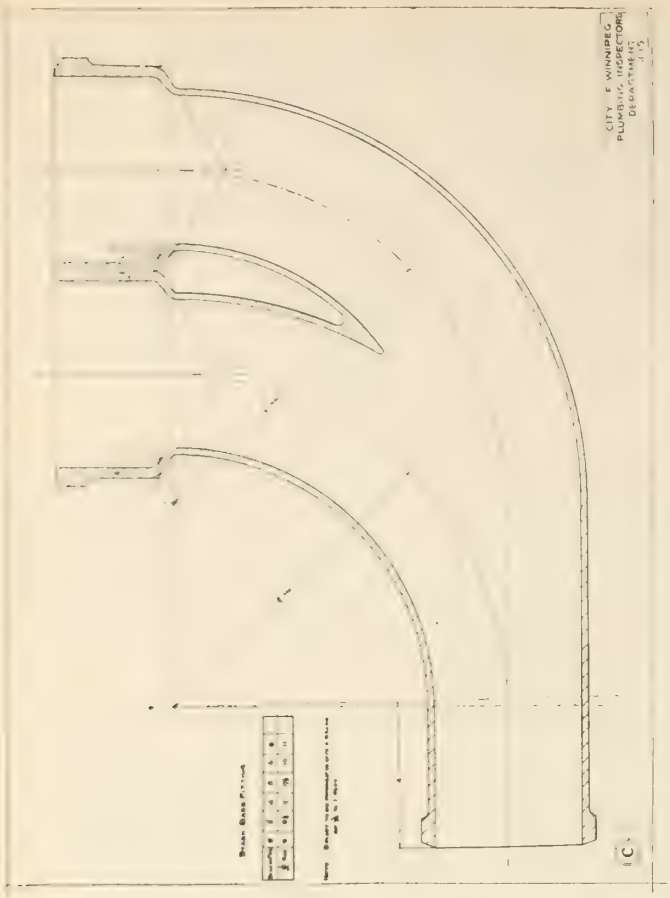
(4) All bends and offsets to have an easy radius.

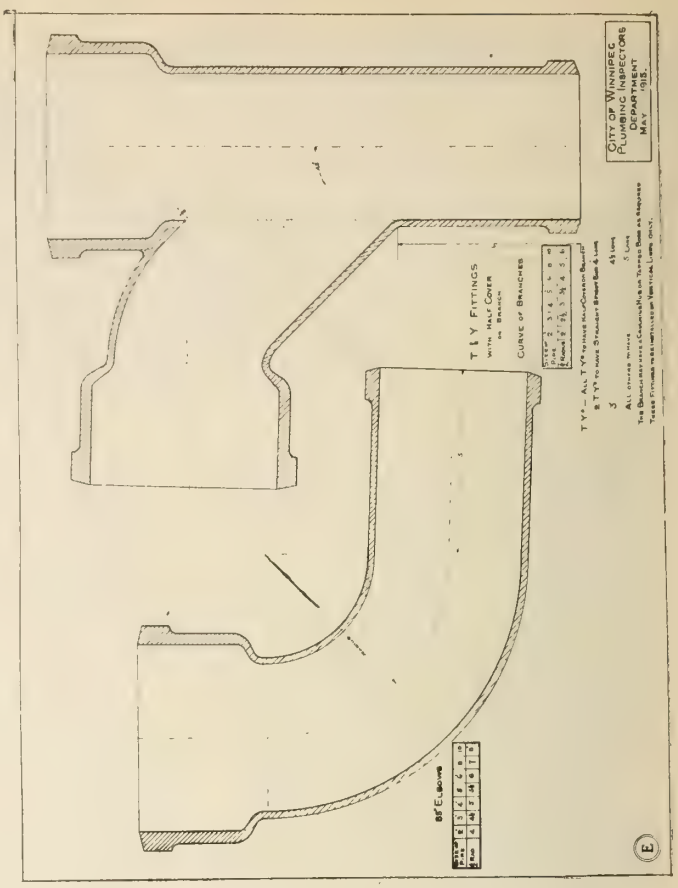


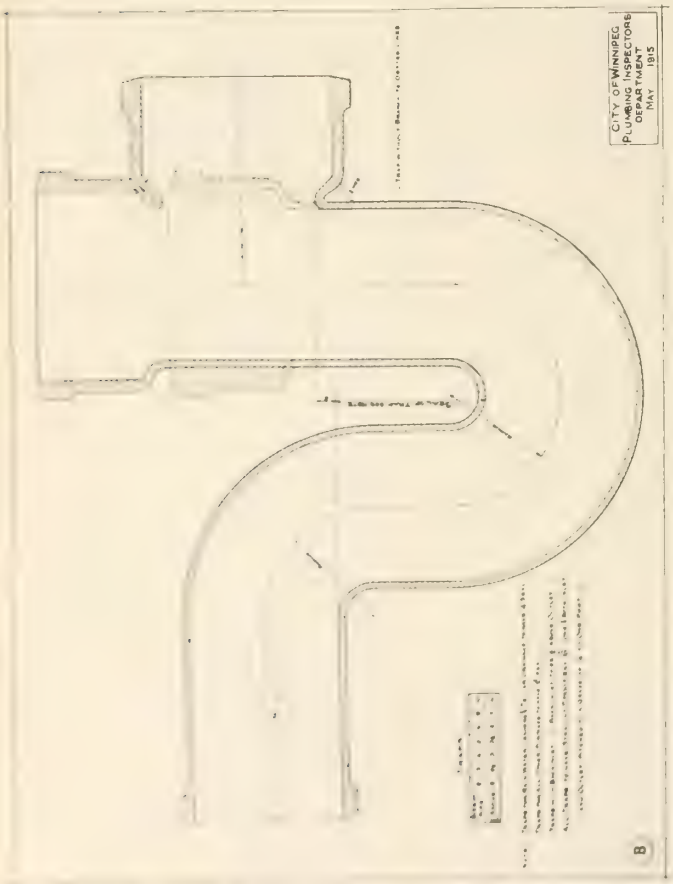
(5) All fittings to have sufficient length of spigot end to allow the joints being properly caulked.

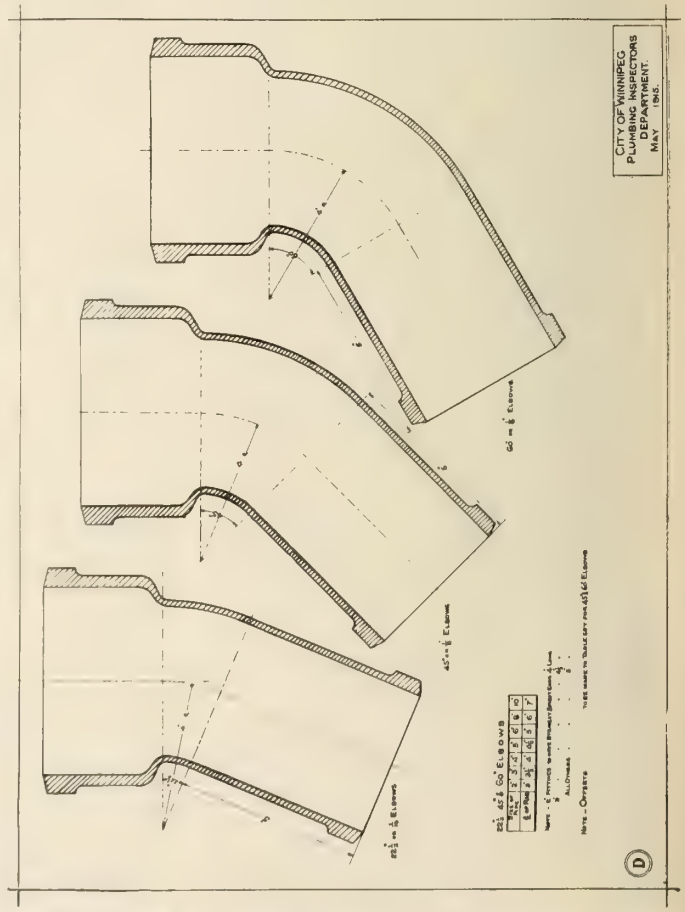
(6) Bends at base of stack, we recommend the use of a long sweep bend with two hubs which permits of a cleanout being caulked in at the floor level. See drawing "C."

(7) For Durham or recessed fittings for wrought iron pipe we deprecate the use of the short branches and quick bends much in vogue at present and re-





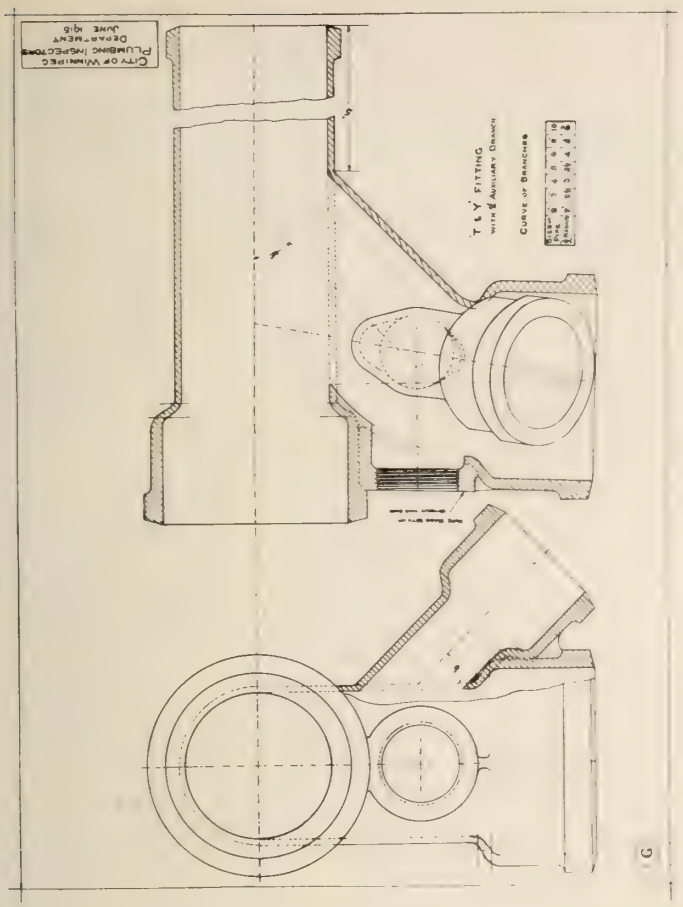


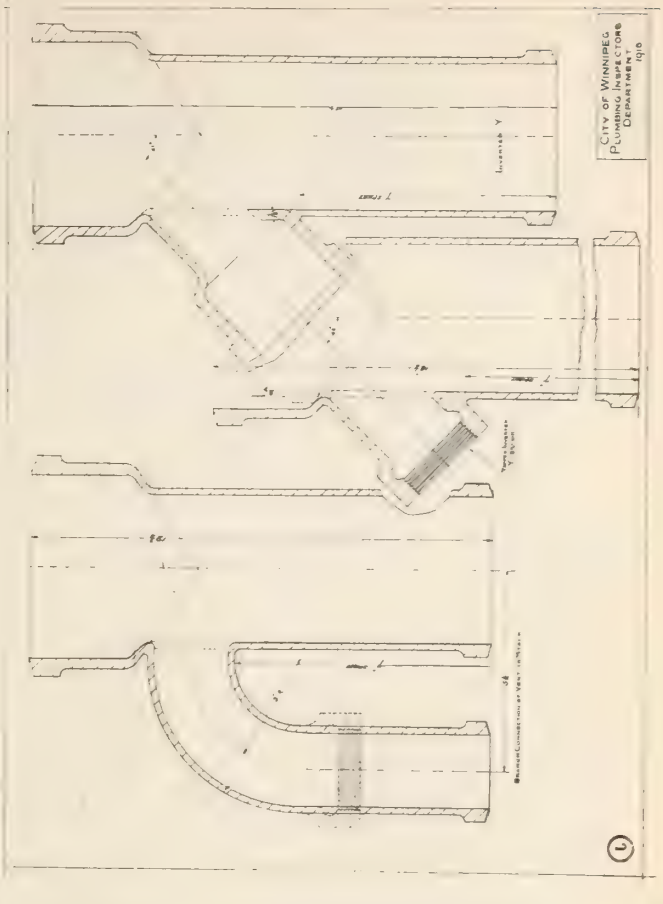


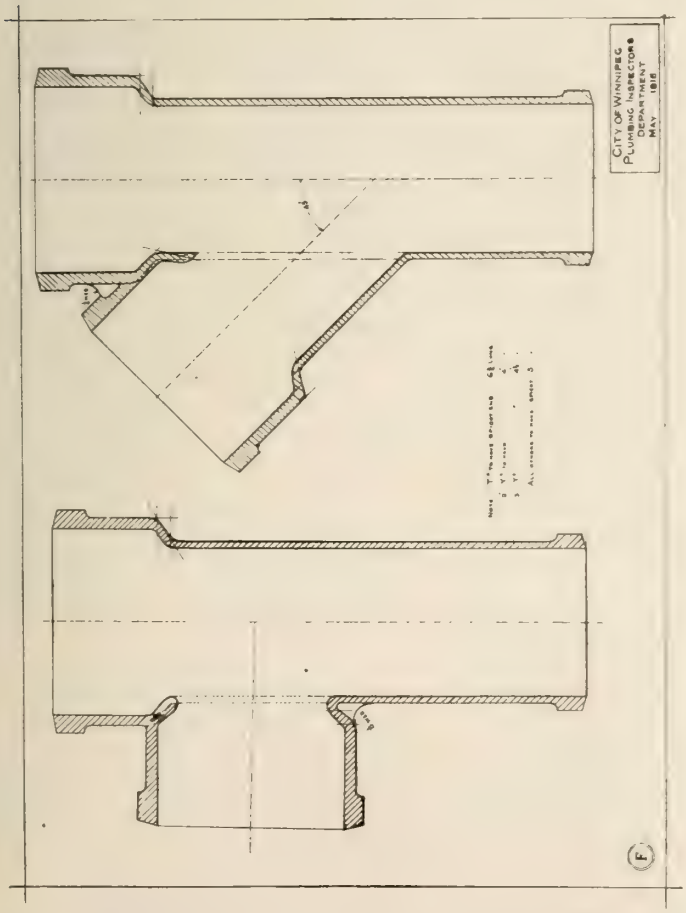
removed the T and Y branches and long sweep bends in their stead.

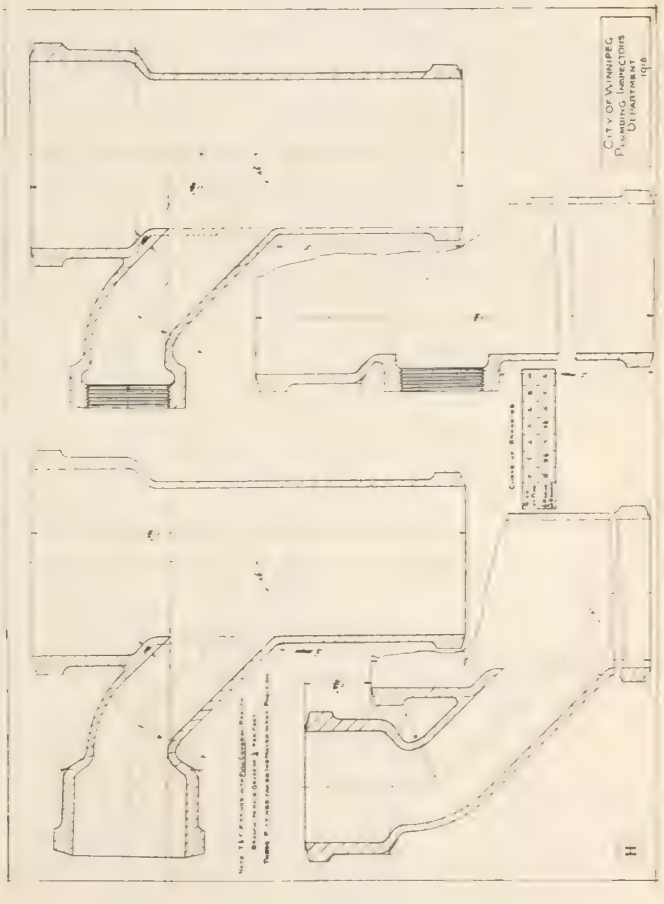
In preparing tables we decided to deal only with diameters, radii of bends, length of spigots and wall thickness of pipes, fittings and hubs, leaving weight to be determined later when the pipe and fittings would be decided upon.

A number of drawings were prepared embodying the foregoing principles and were submitted to the convention for approval. In the discussion which ensued

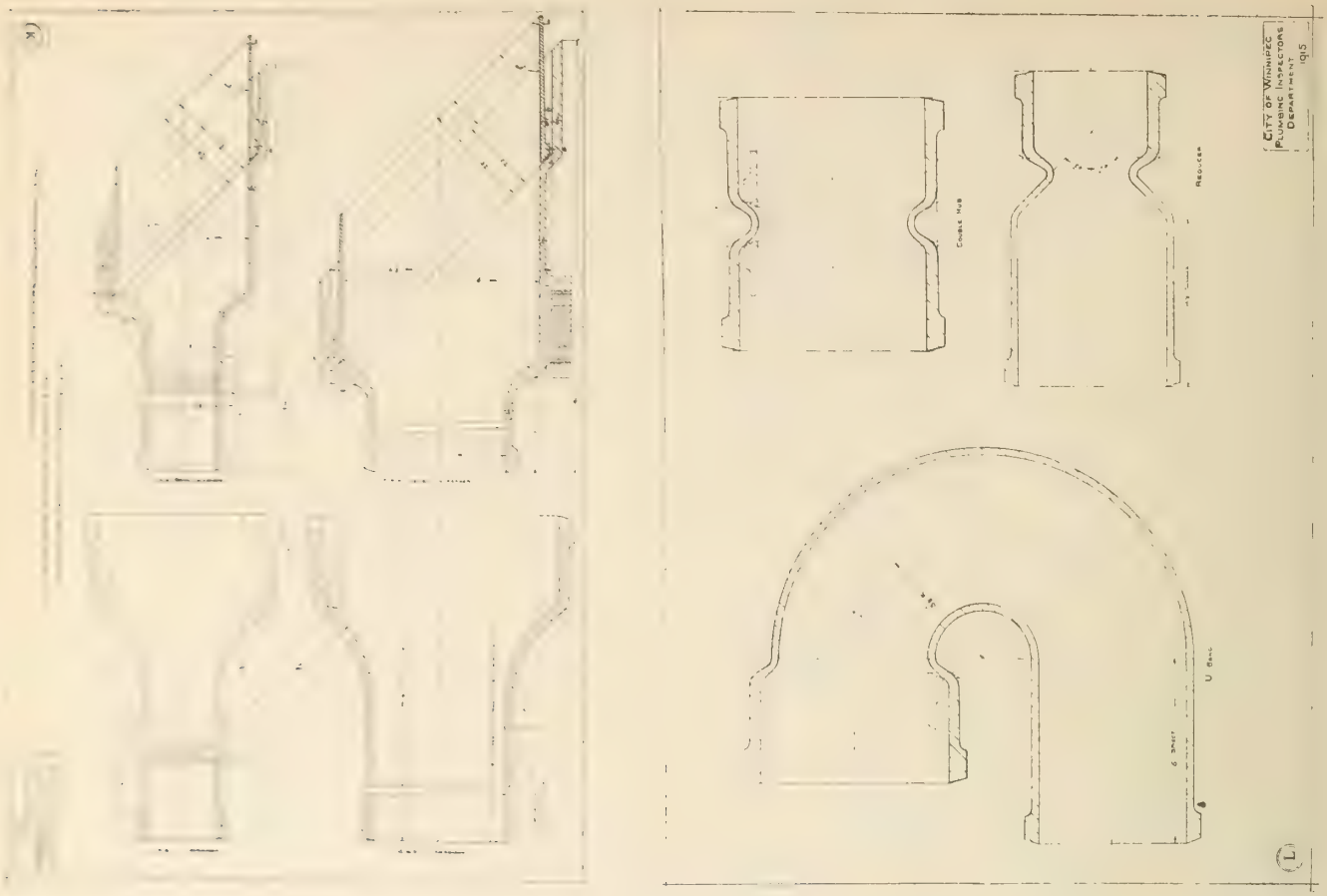








and in which we had the benefit of the experience of L. L. Anthes, of Anthes Foundry Co., Ltd., Toronto and Winnipeg, it was shown that with the easy radius and the 6-in. spigot as shown on the drawing, some of the fittings were going to be unnecessarily long, but it was also brought out that by raising the branches higher on the main stack this difficulty would be obviated considerably. It was decided to accept the tables and drawings showing dimensions, dia-



meters and wall thickness of pipe and hubs, it was also decided that with the exception of those having a square corner or break in the outline, such as square tees, traps, etc., all fittings 4 in. and over have a straight spigot end at least 5 in. long, and it was the consensus of opinion that anything less than 5 in. was too short for easy caulking, and besides it was felt that if we were to have a change, then it should be of such a character as to eliminate the chance of any more trouble or annoyance arising from this cause in the future.

This point has been greatly questioned by manufacturers in the States who have written me on the subject since these drawings appeared in the trade papers, several of whom seem to be of the opinion that we wish to make the manufacturer immune to a certain extent from foreign competition; an accusation we repudiate as the question of a special benefit to any particular set of manufacturers never occurred to us. What we do want and what we intend to get if at all possible is a line of hub and spigot fittings that can be caulked and tested satisfactorily and in doing so, no hardship will be placed upon manufacturers but does not exist at present. We look upon this matter from the angle of the practical man installing these fittings, the master plumber who employs him and who saves time and therefore money when the joint can be expeditiously and satisfactorily made, and finally from that of the inspector testing the work, who finds that 95 per cent. of the leaks on cast-iron soil pipe work are at joints on fittings where it is impossible to properly caulk them.

These are our reasons for proposing a change in the spigot lengths of fittings and I make bold to say that there is not a practical man who would not uphold us in our contention that the spigot lengths are entirely too short for certain classes of fittings such as tees, traps, etc.

Since our last convention at Edmonton and after consultation with manufacturers and others to get the essential features of all interested parties we have prepared a number of drawings embodying the suggestions made at and since the convention which we intend submitting to the next convention of the Canadian Institute of Sanitary Engineers for their approval.

The following is a short and concise statement of the essential features of the pipes and fittings shown on the accompanying drawings:

Drawing "A"

Tables and sketches showing diameters and lengths of pipes, depth of hubs and wall thickness of hubs, pipes and spigots. These follow in a similar manner the same line as the "Naco" pipe with which we in the west are more or less familiar, with the exception that for all pipe 4 in. and under, we have decided to use what is termed "Med" pipe.

Drawing "B"

Detail of traps as decided upon by the convention showing a 4 in. seal for all cellar drain and rain water leader traps and a 2 in. seal for all other traps. All traps to have 6 in. straight spigot and to have outlet and inlet pitched to have a grade of at least ¼ inch to a foot, which we thing is a very essential point in their construction.

Drawing "C"

Fittings for the base of stacks giving an easy sweep from the vertical to the horizontal with a corresponding sweep branching in front and terminating with a hub into which a cleanout can be caulked at floor level or should the fitting be under the level of the floor it may be extended to floor level with a short piece of pipe and a cleanout caulked in.

Drawing "D"

1-16th, 1-8th and 1-6th elbows with 4 in. centre line radius and 5 in. straight spigot. All offsets to be made 45 degs. and 60 degs. with same detail as 1-8th and 1-6th elbows.

Drawing "E"

1-4 elbow with 5 in. centre line radius and 5 in. straight spigot, also T-Y on the combined T and Y principle with half cover on branch and 5 in. spigot showing the branch raised on the main body thereby curtailing the length of the fitting as much as possible to permit of easier handling in the course of construction. All T-Ys to be constructed after this pattern and to be used on vertical lines only.

Drawing "F"

"T" with spigot 6¾ in. long, which

we think is necessary, owing to the close proximity of the branch hub to the joint underneath, also "Y" with spigot 5 in. long. These fittings have the branch raised in the same manner as the T-Y which shortens the fitting.

Drawing "G"

T-Y with 2 in. waste pipe branch connecting to main branch at an angle of 45 degs., which may be cast on either side of branch., it also shows a 2 in. screwed boss vent connection which may be cast on for the purpose of venting fixture branches where the traps on these are within a certain prescribed distance from the vent.

Drawing "H"

Full T and Y showing the branch opening on main body fully covering the branch line and showing branch with caulking hub or tapped boss. These may be installed in any position. T and Y with upright branch for waste or vent line bottom connections. Tapped tee for vent connections. These fittings show the branches raised upon main body and thereby shortening the fitting.

Drawing "J"

Fittings for vent connections with 7 in. spigot end and with the branches raised on main body.

Drawing "K"

New type of terminal agreed upon by the Canadian Institute of Sanitary Engineers for the purpose of eliminating to a large extent the possibility of the terminal being frozen during the cold spell. The terminal for pitched roofs to be made at an angle of 45 degs and 30 degs. to the horizontal. The flat terminals to be used on flat or low pitched roofs. These terminals may have a 2 in. vent connection cast on side as shown.

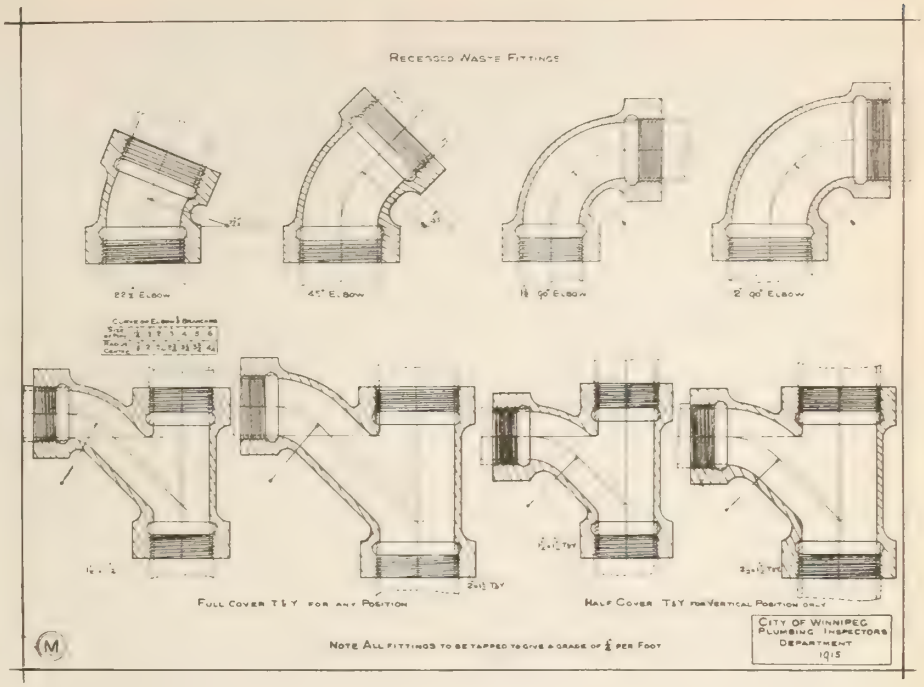
The rings caulked into these hubs to be 1½ in. longer than the depth of hub with bead cast on end as shown.

Drawing "L"

"U" bends to be used only on fresh air pipe terminals. Double hubs and reducers.

Drawing "M"

Recessed fittings for Durham installation having easy radius and designed so that they can be installed in partitions.


RECESSED WASTE FITTINGS
22½° ELBOW
45° ELBOW
¼ 90° ELBOW
2 90° ELBOW
FULL COVER T & Y FOR ANY POSITION
HALF COVER T & Y FOR VERTICAL POSITION ONLY
(M)
NOTE ALL FITTINGS TO BE TAPPED TO GIVE A GRADE OF ½ PER FOOT
CITY OF WINNIPEG
PLUMBING INSPECTORS
DEPARTMENT
1915

MODERN INVENTIONS

By George Fitch

LONG, long ago the housewife swept her floors with a bundle of switches tied together around a handle.

Nowadays she sweeps by turning on a single switch. Thus life has become simpler and more economical.

Nowadays, however, a switch has to be connected with a vacuum cleaner before it will work. A vacuum cleaner consists of a large vacuum stuffed into the bosom of a small aluminum machine. When the machine is started, it sucks in its breath with a deep, hissing sound like the villian in East Lynne and whatever is on the floor gets sucked in with the breath.

The vacuum cleaner has made housework so easy that women's clubs are increasing at an unprecedented rate. Whereas a woman once had to herd a peck of debris over the carpet with a heavy broom once a day in order to keep her neighbors from commenting on her housekeeping, she now merely wheels out her captive vacuum, turns on her electricity and accumulates a peck of dirt in the thorax of the machine in five minutes. A woman can run a vacuum cleaner and read a good book at the same time. If there was only some way of vacuum cleaning dishes, even actresses would get married and live happily ever after.

Vacuum cleaners are making this a cleaner and happier world. For 100 times the price of a good broom one can yank the dust out of a home instead of chasing it from room to room until it finally crawls into the lungs for safety. The vacuum cleaner has contributed to the high cost of living problem, but like many another contributor, it has greatly increased the desire to continue living indefinitely.

Vacuum cleaners have just began their usefulness. If the Pullman porters were compelled to use a vacuum cleaner instead of stabbing their patrons twice in the back with an old wisk broom for ten cents, travel would increase. If vacuum cleaners were used in politics half our legislators and many of our statemen would diappear entirely while the genius who invents an overgrown vacuum mounts it on wheels behind a water tank and trains it to suck the dust from the country roads and deposit it on the roadside in liquid form, will be canonized by the automobile owners of the world.

SEWAGE DISPOSAL

Advancement Made in Treatment and Disposal Methods

During recent years, marked progress in methods of sewage disposal and treatment have been made in Canada. A recent investigation made by the Commission of Conservation revealed the following: In Ontario, of the total number of municipalities having sewerage systems, 37 per cent. treat their sewage; in Quebec, 12½ per cent.; in Manitoba, 33 per cent.; in Saskatchewan, 80 per cent.; in Alberta, 43 per cent.; in British Columbia, 44 per cent. The Maritime Provinces cannot be compared on the same basis, as most of the sewerage systems there discharge directly into the ocean, and treatment would be superfluous.

Conditions with regard to sewage disposal are better in the west largely because the systems have been more recently installed, after the necessity of treatment had become apparent to all. The great majority of the systems in the eastern provinces were installed before this necessity had become so universally recognized, and, as they were not laid out for this purpose, it is in some cases costly to make the change. However, marked improvement is also to be noted, and practically all new sewerage systems either include treatment plants or are designed and installed with the view to the future installation of such plants at the minimum expense.

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 20

Microscopical Examination of Water Continued.

IN the last article it was shown that by the use of even an ordinary microscope many small articles ordinarily foreign to water supplies could be detected if sewage were present. The presence of such articles in water is always a strong evidence, therefore, of sewage pollution. In this connection a microscope magnifying say 10 diameters and costing a dollar or less may give excellent service. Larger articles may also be found that do not need a microscope to determine their nature. For example the writer was surprised to note when visiting the City of Washington the great numbers of matches floating in a tank through which the sewage from the city passed and from which all floating matters are removed.

Though a microscopical examination of water derived from a well may show the presence of matters that indicate that surface water has been draining into it, yet the microscope is of most value in the examination of water from streams, rivers and especially ponds, lakes and reservoirs which latter favor microscopic growth. Such an examination will, as explained in the previous article, determine what microscopic plants or animals are present. In this way the causes of taste, odor and in some cases color, turbidity and sediment are found, for all may be the results of microscopic growths.

Disease producing bacteria, if present, are too small and too scattered to be discovered by ordinary miscroscopic methods. For such a purpose a bacteriological examination, to be later explained, is the method to be employed. It should be noted that the common kinds of microscopic growths are not the cause of disease, nor do they necessarily [illegible] pollution.

The subject of what has been termed the microscopy of water is very interesting but it is not within the scope of these articles. The different microscopic animal and plant growths have all been studied and classified. All that can be attempted here is to show a few diagrams of the more important micro-[illegible]

Euglena (see Fig. 46)

The Euglena is an organism averaging about 1-250 of an inch in length. It is a very low form of life and interesting from the fact that it lies on the border between animals and plants. An animal takes its nourishment through a mouth and has a digestive tract while a plant is nourished through its cells walls. The Euglena is however nourished in both ways. It is green in color and if present in large quantities may color the water green. The flagellum shown in the figure enables the Euglena to swim about. It lives on decaying vegetable matter and is often found in water polluted with sewage. Hence its presence is significant; if found in a water sample it throws suspicion on the water supply.

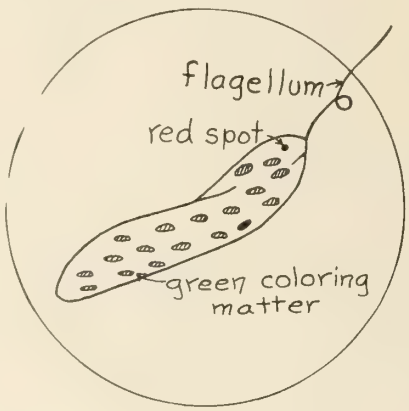


FIG. 46

Magnified 500 diameters
Diagram of the Euglena found in sewage polluted water.

Crenothrix (see Fig. 47)

A microscopic plant form that grows well in the dark and needs iron for its development. Hence it makes a breeding ground in water mains. Tangles of these growths colored yellow or brownish from the iron present attach themselves to the inside of iron pipes and in time became part of the walls. It is estimated that the carrying capacity of pipes may in some cases diminish by 1% yearly from this cause. Crenothrix may also grow in the iron casing of driven or drilled wells.

Blue Green Algae (see Fig. 48)

Algae grow, sometimes in large quantities, in ponds, lakes and reservoirs. These plant growths are generally a blue green in color and they can live only in the presence of sunlight. They give disagreeable odors and tastes to waters in which they grow. The odor is described as grassy or moldy. Fig. 48 shows two varities of the Anabaena, one of the Blue Green Algae. Such growths in reservoirs can be prevented by covering them over from the sunlight but this is not always practicable nor desirable, especially in regard to bacterial purification, for which sunlight is so necessary. It has been found that a very weak solution of copper sulphate will kill the algal growths.

Asterionella (see Fig. 49)

The asterionella is a plant which causes in open and undisturbed bodies

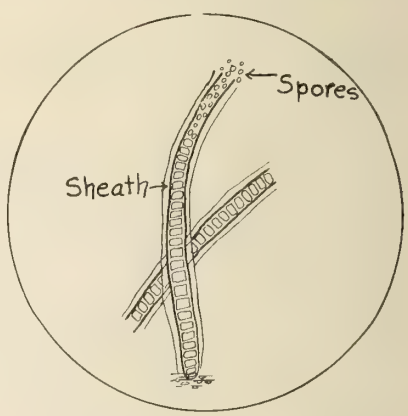


FIG. 47

Magnified 500 diameters
Diagrammatic representation of Crenothrix, which grows in iron water pipes.

of water such as ponds or reservoirs a very unpleasant odor. When they are abundant the odor is fishy and nauseating. It is brownish or golden yellow and very beautiful to look at under the the microscope. This star shaped plant so symmetrically formed is about 1-200 of an inch in diameter.

Crustacea (see Figs. 50 and 51)

The Crustacetae are animal forms, the most common of which (see those illustrated) are somewhat less in size than the head of a pin although some of them are much larger and easily studied without a microscope. Figs. 50 and 51 show two varieties of fresh water crustaceans popularly called "water-fleas" on account of the way they jump about. It will be noted that they are much more highly advanced forms than some of the preceding. The lowest animal form

have no organs of sight but the crustaceans shown have advanced to the dignity of an eye apiece. Such animals are no more harmful to water supplies than fish who feed upon them. The crustacea feed on algae and other plant forms some of which have been mentioned.

The reader who is further interested in this subject of microscopic growths in water should read "The Microscopy of Drinking-water" by G. C. Whipple. In this book the methods employed in the examination of small animal and plant growths are described.

HOW TO COLLECT WATER SAMPLES

Before taking up the chemical and bacteriological examination of water, which examinations are undoubtedly the most important from a sanitary standpoint, the question of the collection of water samples will be considered. It is not practicable or desirable that every sanitary engineer should make his own anaylses of water samples but every sanitary engineer should be thoroughly conversant with the rules and precautions necessary for collecting water samples. The same care does not necessarily have to be observed in the collection of samples for a physical or microscopical examination merely, as for a chemical and particularly a bacteriological examination. It is quite apparent that bottles used in collecting samples of water if not perfectly clean may contain chemical substances or bacteria that will mar the results of the analysis.

Quantity of Water required for Sample

For the ordinary physical, microscopical and chemical analysis at least a half a gallon and better a one gallon glass bottle should be filled. For a bacteriological analysis a six ounce glass bottle is generally used as at least two ounces is required. A flat six ounce glass bottle fits easily in the pocket.

Kind of Bottles

Metal or pettery jugs are not suitable for collecting water samples. Glass bottles should be used having ground glass stoppers.

The following information is taken from "Standard Methods of Water Analysis" published by the American Public Health Association:—

"Sample bottles shall be carefully cleansed each time before using. This may be done by treating with sulphuric acid and potassium bichromate, or with alkaline permanganate, followed by a mixture of oxalic and sulphuric acids and by thoroughly rinsing with water and draining.

When clean, the stoppers and necks of the bottles shall be protected from dirt by tying cloth or thick paper over them.

By shipment bottles shall be packed in cases with a separate compartment for each bottle. Wooden boxes may be lined with indented fibre paper, felt, or some similar substance, or provided with spring corner strips, to prevent breakage. Lined wicker baskets also may be used.

Bottles for bacterial samples, besides being washed shall be sterilized with dry heat for one hour at 160° C., or in an autoclave at 120°C. for fifteen minutes. For transportation they may be wrapped in sterilized cloth or paper or the necks may be covered with tin foil and the bottles put in tin boxes."

In articles 3 of this series (May 1st, 1915), hot air sterilizers and auto claves were described and illustrated. For bacterial samples the glass stoppers may be covered with rubber sheets 4½ inches square and held on by elastic bands. In no case should sealing-was or paraffin be placed on the stoppers of any samples bottles.

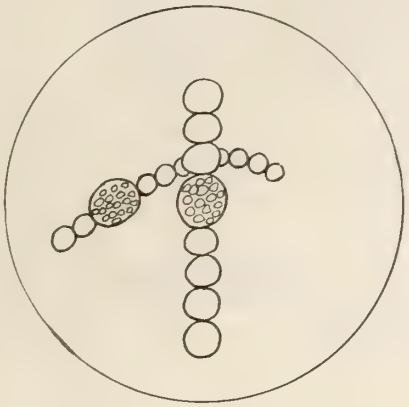


FIG. 48

Magnified 500 diameters
Diagrammatic representation of two varieties of the Anabaena (one of the Blue Green Algae) that give a grassy odor to the waters in which they grow.

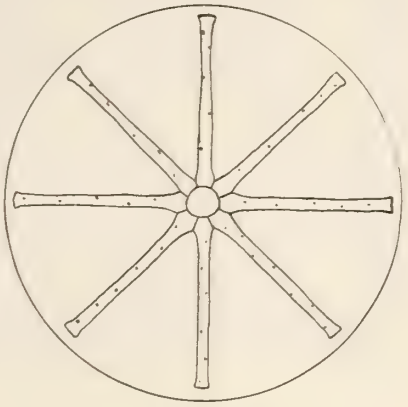


FIG. 49

Magnified 500 diameters
Diagrammatic representation of the Asterionella, a plant which when abundant causes a nauseating odor in water supplies.

Collecting of Samples

Assuming that the sanitary engineer has received from the analyst, bottles cleansed, and if necessary sterilized, he is now in a position to collect his sample.

It must be remembered that everything exposed to the air is covered with bacteria. The first water coming from the tap or the pump would include all of the bacteria that had settled in the tap or in the pump since it was last used. It has therefore been advised to sample the water from a well only after five minutes pumping, or from a tap only after the water has been running for five minutes. In this connection "Public Water-Supplies" by Turneaure and Russell may be quoted:—"Great care should be used to secure a representative sample. If from a well, the water should be pumped out so as to remove that which has been standing in the pipe. In a dug or open well it may even be pre-

(Continued on page 26.)

FIG. 50

Magnified 25 diameters
Sketch of one of the Crustacea A "water-flea" that in outline re sembles an elephant somewhat.

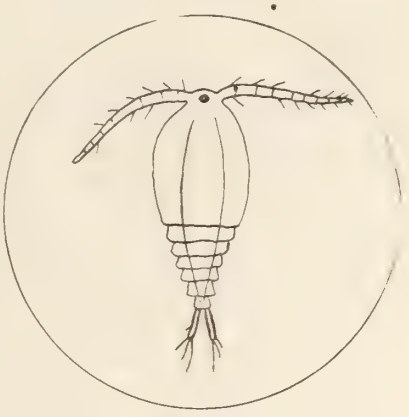


FIG. 51

Magnified 25 diameters
One of the Crustacea termed Cyclops. It has but one eye.

THE SANITARY ENGINEER

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JANUARY 15, 1916

TECHNICAL EDUCATION

THE year 1916 in Toronto has every appearance of being one of the most important ever experienced in the sanitary and heating profession. The reason for this is that for a number of years the Toronto Society of Domestic, Sanitary and Heating Engineers have been devoting a great deal of time to the question of technical education.

Mention is made in the society's report on technical education which appears in Jan. 1st issue, that plumbing classes have been formed and are being conducted in the new technical school. Material has been donated by various manufacturers and a teacher procured.

A special room has been provided for the erecting of full size installations, so that students will be actively engaged in practical work, not mere experimental work by any means.

Thus both the theory and practice is being taught the students in attendance.

In some future issue THE SANITARY ENGINEER will show work in construction, along with this technical education the next step will be to encourage the student to devote some time to the studying of business management. The lack of business training is almost as great a drawback as lack of technical knowledge. 90 per cent. of those evils which most members of the craft seem to be heir to is that of the lack of business training.

It has often been stated that a good mechanic can never hope to possess a knowledge of sound business ethics. This should not be, and will not be when the next generation now training have absorbed all they can in the technical school.

The reason why most mechanics have proved to be poor business men is because it has cost them too much to keep ahead in the mechanical end, problems of a mechanical nature have had to be mastered without the necessary technical training, but with such training the efforts will not be so great and better business methods will therefore be adopted.

There are, however, thousands of men throughout this Dominion that have not access to technical education as in the case of persons living in large centres.

But this should not debar them from becoming more efficient. There are splendid correspondence colleges, the teachers of which are highly trained men. Men who are not only in the business for mere dollars and cents, but who actually feel the need that 90 per cent. of our craft have of technical education.

The cost of doing without a technical training is enormous, in comparison to the cost of such correspondence courses, and if during these winter evenings a little time is devoted to studying such a course, no doubt the time and money thus spent will result in greater efficiency.

STOCK-TAKING SEASON

MOST sanitary and heating engineers, we hear, are taking stock at this time. There is nothing like taking stock at least once a year. Some concerns have gone so far as to start a system whereby the stock can be checked up at any time. This is done first by entering all stock on hand. Then the various items of every consignment of goods received are promptly added to this stock account and all goods sold or used are credited. In this way it is possible to know at very short notice how one's stock stands

There is, however, another very important feature not to be lost sight of at this time, viz., that of the valuation of such stock. 90 per cent. of the goods which most sanitary and heating engineers have on hand just now is far more valuable at the present moment than was the case when the purchases were made. Now, how should this stock be valued? it may be asked. That just depends upon what kind of a balance sheet one wishes to strike off. But one

thing which is most important is that the present value should be noted so as to arrive at an accurate selling price.

The value of goods should not be increased on the books, because no such goods would bring anything like such a value at a forced sale.

One thing should be done, and that is, interest should be added to the invoice cost price, as also should a proportion of last year's overhead, but the most important of all, as we stated before, should be the present selling price.

Just recently we cited a case where a certain sanitary engineer took a contract and furnished the material at a much lower price than he could at that time have bought the goods for. Since then, material has still gone up. Boilers and radiators have just been advanced 10%, with every possibility of another advance at some very close date.

All goods which contain copper, tin and lead are away up and are likely to go higher, so that in valuing stock on hand, the new selling price should be carefully noted and in that way those who bought none too wisely in larger quantities may find themselves the possessors of very valuable stock.

The next best thing after the stock-taking and inventory has been completed, is to lay plans to unload this stock by getting present business. In thus urging the trade to go after business while prices are high, it is not intended to convey the idea that prices are apt to drop. The real facts are no metal expert can make the faintest guess as to how things will go. The metal market is so unsettled.

HUMIDITY

AN another page in this issue there appears an article which shows the importance of humidity in the home. The subject is of far greater importance to Canadian people than almost any other because of the climatic conditions.

In winter time, 99 per cent. of the homes are closed up tight in an endeavor to keep out the cold. This results in little or no ventilation, and poorly ventilated homes breed all manner of diseases.

Pneumonia always claims an increased number of victims in cold weather, and yet it is not a disease of low temperature. The Eskimos never have it, and their immunity is shared by white explorers of the arctic. Pneumonia is a germ disease, which becomes particularly virulent in winter because people shut out fresh air in the effort to keep warm. It is the deadliest of foul-air ailments. The work of the sanitary engineer has for years been recognized as having to consider only the installation of plumbing, or sanitary fixtures, such as baths, W.C.'s, lavatories and the like. Yet how many homes thus equipped are veritable disease incubators? Thousands, we would reply. And why? Simply because the heating and ventilation has not been given proper attention.

Even those buildings which have been provided with the most modern heating systems as well as ventilation have been found lacking proper facilities to furnish humidity.

Large buildings, such as churches, halls, theatres, etc., which are equipped with air washers and indirect heating systems are to be found throughout the country, but few, if any, of our homes are being provided with humidifying apparatus. Not because such apparatus cannot be produced. On the contrary, there are quite a number on the market at present, some of course more reliable than others; but all or any of these appliances are better than none. As is stated in the article referred to previously, the question of humidity should be taken into consideration by every one who submits a tender on heating systems.

Those who do consider this very important requirement will not only be recompensed by doing a certain amount of increased business, but will also be able to lay claim to the just and proper title of "Sanitary Heating Engineers."

JUST SCRAP

UNDER heading of stock-taking, the question of the present prices of material is discussed and the trade are urged to take note of the re-sale price of goods. The question of old metals or scrap should also receive quite a little attention just now, and particularly by the sanitary and heating engineer.

On another page will be found the prices at which dealers in old metals are prepared to buy.

Never was there such a demand for old metals as there is at the present day. Such metals as copper, brass, tin, lead, aluminum and zinc are commanding splendid prices and if the sanitary and heating engineer will collect all his scrap metal, sort it carefully and ship it to some reputable metal dealer, they will find that scrap metal means gold. It will look a whole lot better to possess a respectable cash-on-hand account, than a big pile of junk. We would strongly urge every owner of an establishment to clean up all surplus scrap metal and unload while prices and demand are good.

EDITORIAL BRIEFS

UNLESS A person can take stock of himself once in a while and find that he possesses more real earning power, his stock is on the decline and he will be found amongst the bread line class. To earn more one must learn more.

* * *

THERE ARE two kinds of brains; some are bought by the pound and others by the minute. Which kind do you possess? Take stock and find out.

Don't Knock Off the Odd Money

Collecting an Account Requires a Certain Amount of Tact—Never Begin to Threaten Proceedings—But Never Reduce the Amount of an Account, in Order to Secure a Settlement

By "One of Us."

THERE is no denying the fact that ninety per cent. of the trade dread having to go out collecting accounts. The same proportion, or at any rate 60 per cent., do not pay sufficient attention to the rendering of an account.

Neither of these things should be. But there is still another matter which does not by any means reflect credit on those members of the trade who are in the habit of indulging in it. I refer to the practice of deducting sums from an account in order to secure prompt settlement.

I believe if every sanitary engineer would keep a strict account of every cent deducted in this way for one year he would be surprised.

But we all know these things. I want to relate a couple of incidents in connection with settling accounts for less than was on the statement. One was for $11.70, the other for $13.70, and by a strange coincidence these cases were both handled in the same way.

About a month ago I was paying a few calls and dropped in to see one of the boys. We were having a chat about a number of troubles which almost all of us are heir to, when all at once Robinson (which doesn't happen to be his real name) says: "Here's Mrs. Thomas, she has owed me $13.70 for about a month of Sundays," and in she walked.

"Good morning, Mrs. Thomas," said Robinson. "What can I do for you this morning?"

"Well, I've come to pay this account I'm owing you. Do you know, Mr. Robinson, it would have been paid long ago, but I think it's altogether too much. I feel sure there must be some mistake," and she handed him the bill. She went on: "You know I asked three or four more plumbers for a price on that job, and the highest was only $12, and one was as low as $10. You know I didn't ask you for a price, because the work you've done for me has always given me satisfaction; but I never thought it could have cost more than $11 or $12, and here you charged me thir-teen-dollars-and seven-ty-cents. It's a downright shame the way you folk charge us up."

Well, Robinson finally got a chance to look up his account book, and ran over the [illegible] very carefully. Finding that each item was correct, he told Mrs. Thomas so, and finally she said: "Well, look here, Mr. Robinson, I'm perfectly sure that the bill is too high. I also realize that I've owed it a while, too. (It happened to be a four months' old account.) But if you'll be reasonable, Mr. Robinson, and take $12 and settle the bill, I'll pay it and get it off my mind."

Now what do you think nearly happened. Why, you could just see Robinson itching to get his hands on that $12; but I gave him a look, and he held back.

I then turned to Mrs. Thomas and said: "Well, Madam, you will pardon me, I hope, if I take a hand in this matter.

"I have just made arrangements with Mr. Robinson to become sleeping partner. Mr. Robinson has been in business for over ten years, and if he paid every cent he owes he could not say he possessed $100. He's worked hard; he's a splendid mechanic; but here he is not worth $100.

"Now, Mrs. Thomas, I've listened to all that has been said and object very strongly to you asking for a reduction. The account is O.K., and you have owed it for four months. If you had had a complaint to make, you should have made it long ago. You have owed this account, as I said before, for four months. At 6 per cent. the account in round figures should be $13.98, and still you want a reduction of $1.70."

"Yes," she said, "and I'll have it before I pay the bill at all."

However, I replied: "Well, there is one thing, Madam, we certainly need the money, and we don't want to lose a customer like you, because I hear that you have always liked Mr. Robinson to do your work, etc., and as I told you before, I am practically taking an interest in this business; I want to see things run smoothly, etc., and if we take $1.70 off your bill, we have not only lost the $1.70, but also the use of $13.70 for four months, which would have been worth more than 6 per cent. if we could have turned it over several times during that period.

"But, I'll tell you what we'll do. We'll give you a receipt for $12, the amount you pay us."

"Oh, no, sir," she almost screamed into my ears, "If you can't give me a clear receipt for $13.70 I don't pay a cent."

"Now, look here, Mrs. Thomas, you really don't want a receipt for an amount you do not pay, do you? I have another suggestion. We will not only give you a receipt for $12, but we will write on the bottom of the account that we agree never to render another account for the balance, or even ask for it in any shape or form."

"That's all right," she replied, "that's good enough for me. If I'm never asked for it, I'm satisfied;" and she handed over the $12.

Robinson did as I suggested, and her ladyship was about to leave, when I asked her to stay just a moment, and I said: "Now, Mrs. Thomas, I want you to listen to me a moment.

"You have paid $12, and we have agreed never to ask you for the balance, and we never shall; but there's another thing to take into consideration.

"I want you to strictly understand that you owe us $1.70, and I want you to agree to do something now, though I shall not ask you to put it in writing; that would not be fair."

"Well," she replied, "what is it you want me to do? I don't see that I've anything more to do."

"Well," I replied, "the first time your conscience speaks to you and says to you that you are owing Mr. Robinson $1.70, I want you to obey the promptings of your conscience, and I know, as well as I know that the sun rises in the east and sets in the west, that some of these days you'll call in and pay that $1.70. It's up to you." And from that we began to discuss several other matters in a friendly way.

But before she left, without anyone alluding to the balance, she said: "Gentlemen, I've heard that voice. I want a receipt for $13.70."

The very same thing happened a few weeks later, in another store, except that the latter sum involved was $11.70.

Pneumatic Water Storage and Supply

Pointing Out the Governing Principles of the Pneumatic Water System—All Systems Should Provide For Furnishing Air to Replace Loss by Absorption—More Attention Should be Given to This Subject by Those Installing Pneumatic Water Systems

By R. O. Wynne-Roberts, Consulting Engineer, Temple Building, Toronto

Correction.—It is desirable that an error which has crept into the previous article should be rectified. On page 17, 29th line of third column, the calculation should be $\frac{15\times100}{34\frac{1}{2}} = 43\frac{1}{2}$ cubic feet.

IN case I. the tank was full of air, which had been pumped in until the pressure was equal to the column of water in the pipes above the tank, namely, 19½ lbs. gauge pressure, and by this means the bulk of the tank capacity was available for storage of water.

But in case II. water was admitted—instead of additional air—to compress the air in the tank to the same pressure as in case I., and thereby reduced the actual available storage capacity.

The formula to ascertain the total capacity of a tank that will give the available storage required in these cases is as follows:

$$C = \frac{V}{\frac{A \times Mp - Tp}{Tp}}$$

C = Capacity factor.
V = Total volume of tank, say, 100 units.
A = Volume of minimum air space, say, 33 1/33 units.
Mp = Maximum pressure plus 15 lbs. when tank is, say, two-thirds full of water.
Hp = Ordinary house pressure required plus 15 lbs.

In case I. the house pressure was 19½ lbs., so "Tp" was equal to 34½ lbs. According to the calculation given in the previous article, the maximum absolute pressure when the tank was two-thirds full of water was 103½ lbs., so the capacity factor is

$$C = \frac{100}{\frac{33.33\times103.5-34.5}{34.5}} = \frac{100}{33.33\times2} = 1.5$$

The daily consumption was assumed at 200 gallons, consequently when pumping is done by manual labor, or by gasoline engine, once a day, the total capacity of the tank must be $200 \times 1.5 = 300$ gallons.

In case II., when the tank was two-thirds full of water the maximum absolute pressure was 45 lbs., and the house pressure the same as in case I., so the capacity factor will be

$$C = \frac{100}{\frac{33.33\times45-34.5}{34.5}} = \frac{100}{33.33\times.304} =$$

9.87; which means that under these conditions the total capacity of the tank must be 9.87 times the daily consumption of 200 gallons, so as to afford an available storage for that quantity, it must consequently be $200\times9.87 = 1{,}974$ gallons. This, of course, would not be ecomomical, and pumping would have to be done more frequently.

With an automatic electrically-driven pump the storage capacity required would be less, because, as already stated, pumping would take place whenever the storage was reduced to a certain level. It is assumed that one hour's supply of, say, 50 gallons, would be stored under these conditions. The same capacity factors would apply as in the above calculations; so in case I., $50\times1.5 = 75$ gallons; case II., $50\times9.87 = 493$ gallons.

Case II. has been purposely assumed to show that it is economical to pump in air at the start so as to afford more available storage by utilizing the tank as much as possible.

As a check on the foregoing calculations and to give the reader another way of arriving at the available storage capacity required, it is assumed in all cases that the total capacity of 100 units is provided, and that the minimum of 33 1/3 units must be taken up by air under compression. In case I., as 66 2/3 units of air were pumped in at the commencement, there was an available storage of 66 2/3 units of water. The actual available storage must, however, be 200

(Continued on page 26.)

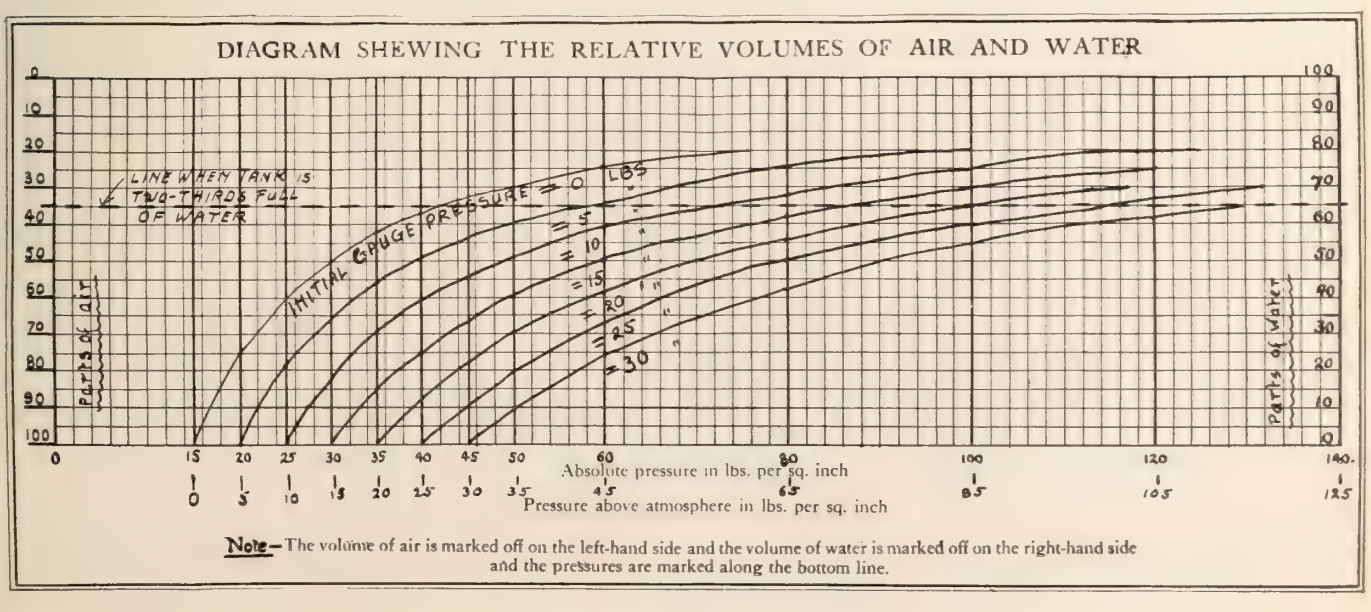


DIAGRAM SHEWING THE RELATIVE VOLUMES OF AIR AND WATER
LINE WHEN TANK IS TWO-THIRDS FULL OF WATER
INITIAL GAUGE PRESSURE = 0 LBS
= 5
= 10
= 15
= 20
= 25
= 30
Parts of air
Parts of water
Absolute pressure in lbs. per sq. inch
Pressure above atmosphere in lbs. per sq. inch

Note—The volume of air is marked off on the left-hand side and the volume of water is marked off on the right-hand side and the pressures are marked along the bottom line.

Analysis of Canadian Plumbing By-laws

Proposed New Plumbing By-law for Montreal—Many Clauses Not Only Ridiculous, But Impracticable, Proving That Sanitary Engineers Should be Consulted in Such Matters—The Sanitary Engineer Takes Full Responsibility for the Criticism Published in This Series of Articles.

ARTICLE 9.

THE next few sections to be commented upon will no doubt be of even more interest than many previous ones taken up. And it will be seen that we agree with most of them more in the spirit than in the letter.

Many by-laws of even very recent date have ignored such matters as have been taken up in the following sections:

Regulations Relative to a Ratio of Water Closets, Male and Female, Also Airshafts, Building Plans, etc.

Ratio of Closets

Section 711.—Each tenement and flat and store shall be provided with one water closet or more.

Male and Female

Section 712.—In all places of employment where men and women are assembled or employed, separate and sufficient water closets shall be provided for males and females.

Closets Names

Section 713.—The water closets provided for males shall be plainly marked "Men's Toilet," and the water closets provided for women shall be plainly marked "Women's Toilet," or equivalent indication.

Closets, Ratio to Occupants

Section 714.—In all places of employment coming under section 712 one water closet or more shall be provided for every twenty-five males, and one water closet or more shall be provided for every twenty-five females, and these water closet facilities shall be provided upon at least every storey, and where there are employees in a basement, such basement shall be considered as being one storey.

Section 711 is particularly valuable, and will no doubt prove very desirable.

One of the chief troubles in large cities is that the front portion of a house is very often turned into a store, the store having no connection with the house in many cases; and there is very often no w.c. accommodation provided for the occupants of such store.

This is one of the reasons why The Sanitary Engineer advocates annual inspection of all plumbing. Alterations to buildings take place, additions to plumbing are made, and oftener than not are not in accordance with the plumbing by-laws.

Sections 712 and 713 require no comment.

Section 714 is very necessary, except that we do not think the w.c. for every twenty-five persons is sufficient.

It might not be so bad in the case of male accommodation, though we would strongly advise that in every building where twenty-five males are employed not less than one w.c. and one urinal stall be provided.

For twenty-five female employees or occupants not less than two w.c.'s should be provided, not only because of the better accommodation, but in case of one w.c. getting out of order, there would always be one available if required.

In addition to ample w.c. accommodation lavatories should also be provided with soap and sanitary towels. While most employers provide lavatories, there are hundreds who will not do so if the law does not compel them. It might, however, be stated that all the four sections referred to could have been embodied in one if properly drafted out.

Closets, Hotels, Lodging-houses and Public Buildings

Section 715.—In lodging-houses or hotels there shall be provided one water closet or more for every twenty-five females and one water closet or more for every twenty-five males. The number of water closets required shall be determined from the number of lodging quarters provided in said lodging-houses or hotels. The number of closets in public buildings shall be determined by the same ratio.

Closets Family

Section 716.—In all buildings used jointly for a residence and business purposes, separate and sufficient water closets shall be provided for the use of families, employees and patrons of the place.

Section 715 is not quite what it should be. In the first place, as stated before, it is our opinion that to allow only one w.c. to every twenty-five persons is not sufficient. This should apply in both lodging-houses and hotels.

Further, in both lodging-houses and hotels, the toilet rooms should be located in different portions of the buildings, so as to ensure strict privacy. The latter part of this section where reference is made to public building requirements, is a little misleading. It could be made to mean that if a public building has seating accommodation for 500 persons it would be necessary to provide 20 w.c.'s.

This would be out of all reason. Very seldom are those w.c.'s used which are installed in public buildings, except by the caretakers or janitors.

Before taking up another section it would be well to mention that there are other fixtures needed in lodging-houses and hotels which should come under the plumbing by-law—that of bath tubs and urinals. There are scores of public lodging-houses where no bath tubs are provided. This should not be. No building is fit for human habitation which does not contain a bath or baths, and particularly the lodging-house. This should not only apply to new buildings, but should be enforced in old buildings. Most cheap lodging-houses have at one time been good-sized residences, and have possibly one bathroom, with one w.c. and an old copper-lined bath. Oftener than not both these, as well as the lavatory, are closed in, and under the woodwork there lurks all manner of filth ond death-dealing germs.

What is the use of enforcing good by-laws for new buildings, while at the same time allowing such pest holes to exist?

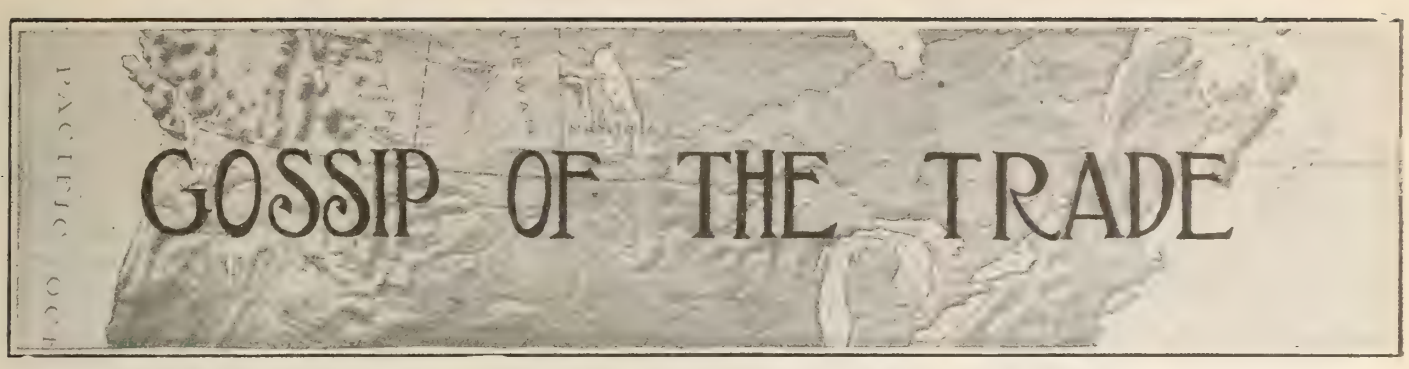
If there is one thing needed more than another in Canada it is that all plumbing should be brought up to standard which is found to be in a poor state of repair.

One of the greatest objections which many speculative builders have is that new buildings must have a certain class of goods installed and in a certain way, which, of course, makes the new installation far superior to plumbing existing in very old buildings.

Section 716 is to be commended. It is one very seldom found in sanitary by-laws, and if put into force cannot fail to be of great benefit.

Many a house has had the front portion turned into a store or other business place, and no lavatory accommoda-

(Continued on page 25.)



JUST PASSED ON

Richard Dunn, who for many years carried on a successful plumbing and tinsmithing business here, passed away on Wednesday, Jan. 12th, in the local hospital from a heavy cold and heart trouble. He was 77 years of age, and is survived by two daughters, Mrs. Dr. Noble, Toronto, and Mrs. George Kay, Detroit.

BOILERMAKERS ASK FOR PROVINCIAL SUPERVISION

Representatives from several Ontario manufacturers of agricultural steam boilers awaited on G. Metcalfe, of the Ontario Boiler Inspection Department, recently requesting that all manufacturers be compelled to submit their designs for government approval. Annual Inspection was also advocated.

In the deputation were: George White, London; Robert Bell, Seaforth, and A. Snider of Waterloo. Mr. Metcalfe agreed that the adoption of the suggestions was advisable and promised consideration.

The Sanitary Engineer is particularly pleased to see such a feeling amongst boiler manufacturers. There is really no reason why such boilers should not come under the jurisdiction of the Ontario Boiler Inspection Department. Annual inspection of all boilers used for heating as well as power purposes would be a boom to every one interested in such appliances.

We are not by any means alarmists but in one case of a steam heating installation which the writer saw, the safety valve began to leak. It was of a common type not worthy of the title of safety valve, and was being held down by the addition of an iron weight on the top of it. In another case, the furnaceman had got a 2x4 batten and had wedged it between the top of the safety valve and the basement ceiling "to prevent it leaking."

If every heating engineer were to record some of the freakish and dangerous devices resorted to by irresponsible men, it would surprise many of us. It is nothing short of miraculous that there are not more accidents than there are.

METALS USED IN MAKING SHELLS

The following figures furnish a comparison between the quantities of the different metals used in the manufacture of 22,000,000 shells, for which orders have been placed in Canada, with our production of such metals in 1913:

Steel used, 400,000 tons. In 1913 it was estimated that the production of iron ore in Canada, 307,634 tons, did not exceed 5 per cent. of the country's requirements of iron in that year.

Zinc used, contained in brass, 11,200,000 pounds. No zinc was refined in Canada in 1913 but the exports of metallic zinc in ore shipped amounted to slightly over 7,000,000 pounds.

Copper used, 55,000,000 pounds. The total production in 1913 was about 77,000,000 pounds and all of it was exported for refining.

Lead, 101,760,000 pounds. The production in 1913 was about 37,665,000 pounds, of which over 97 per cent. was recovered as refined lead.—W.J.D.

SCRAP METAL QUOTATIONS

Scrap Dealers Are Buying at the Prices Quoted Below

Tea lead, packet, lb.	4¼c
Tea lead, chest, lb.	4½c
Lead (heavy) pipe, etc....	5¼c
Brass, heavy, lb.	11½c
Brass, light, lb.	9½c
Zinc, heavy, lb.	12¾c
Copper, heavy, lb.	16¼c
Old cast iron, per ton.....	$12.00
Wr'ght iron, No. 1, per ton	10.50
Wr'ght iron, No. 2, per ton	8.00
Stove plate, per ton	8.50

With scrap metal commanding such prices, those who have not collected their scrap up for some time can do so at the present time to their advantage.

CONSERVATION OF LIFE DEPENDS UPON SANITATION

The conservation of the lives and health of employees is an investment that produces large returns in efficiency and contentment, no line of business is more conductive to good health than the work of the sanitary and heating engineer.

ANALYSIS OF CANADIAN PLUMBING BY-LAWS

(Continued from page 24.)

tion provided. This should not be. If any part of a building is used for business purposes by any person or persons other than members of the same family that occupy the remainder of the building, there should be separate w.c. and lavatories provided. This would prove a benefit to all concerned, and should be enforced.

STARTED IN BUSINESS

Messrs. Johnston & Callbeck have started in business in Alley Street, opposite Brace & McKay's warehouse, Summerside, P.E.I.

We wish them every success in their new venture.

According to a newspaper advertisement, they have taken as their motto: "Service and Quality." Such being the case, they are bound to succeed.

A REFLECTION UPON THE TRADE

Within the last few weeks several fires have been caused by men employed in the sanitary and heating business using the flame of a gasoline blow torch to thaw out frozen water pipes. In one case alone it is reported that a gentleman's country residence was gutted, resulting in a total loss of $60,000. For such a state of affairs to exist in these days of progress seem to be on the face of things little short of deplorable.

A man who uses a naked flame where material of a combustible nature is liable to be set on fire, is a disgrace to the trade.

The best, most thorough way of thawing pipes is by the use of steam, a small boiler made say from the bottom portion of a gasoline fire-pot could be fitted with a small safety valve to blow off at about 2 lbs. and a few feet of hose with a nozzle outfit, all that would be needed found effect than in chemical work.

(Continued on page 27.)

Toronto Society of Domestic Sanitary and Heating Engineers

A Trying Year. Good Work Done. More to be Done. New Officers Elected for 1916.

LIKE all other years, 1915 has resulted in many changes, some for good, some otherwise, and the Toronto Society has experienced a great many changes.

No previous year has been so eventful as has 1915 with this society. Members have joined the fighting forces for overseas. Some are now either in training in England or at the front. Others have found new duties, which called for a number of changes in the officials of the Toronto Society, and to carry on the good work new officers had to be elected.

T. B. Smyth, Toronto, who has worthily filled the position of president during 1915, has retired on account of increased responsibilities. John E. Fullerton, who for many years acted in the capacity of secretary, and was recently appointed instructor of sanitary science and engineering at the new Technical School, also had to be replaced. Mr. Fullerton severed his official connection with no small feeling of regret. He filled the position faithfully, and was a live wire in the society. At every event John was to the fore, and those who know him are assured of his filling the position he has assumed in a creditable manner to one and all.

One thing with the Toronto Society, however, is this, that no member has ever been known to actually lose the brotherly interest in the society, and, though not in office, they can be relied upon to be available if required to help the newly-elected officials do their part. T. B. Smyth, while having retired, could no more think of finally severing his connection with this society than fly.

The work done during the past year will never be forgotten. The problem of technical education was brought up and set on a working basis. An examination board was appointed, and to-day those who wish to engage in the sanitary engineering business must first prove their fitness by passing a practical examination before they can procure a license. The entertainment committee was responsible for many a splendid social event, all of which proved to make the ties stronger between the members. All in all, while, as we stated before, 1915 proved to be a very trying year, the results showed it to have been a successful year for the society.

After the regular reviewing of business done during the year, the following new officers were elected:

New Officers Appointed

President—Fred Gentle.
Vice-President—Thos. H. Ferguson.
Secretary (permanent)—G. F. Frankland.
Treasurer—Thos. Maxwell.
Warden—Geo. H. Cooper.
Tyler—A. F. Passmore.
Auditors—Messrs. A. H. Read and W. R. H. Daniels.

The following were elected to the executive committee:

Chairman of Committees

Sanitary—John Wright.
Heating—Harry G. Waterman.
Arbitration—Thos. B. Smyth.
Legislation—Robt. J. Shannon.
Educational—Fred Wiles.

Conveners of Reception and Entertainment Committees—Messrs. W. E. Ramsey and H. Griffith.

The following additional committees were appointed by the executive committees:

Finance — President, vice-president, treasurer and secretary.

Advisory to Secretary Frankland—Messrs. Gentle, Waterman and Wright.

Membership (Chairman)—Thos. H. Ferguson.

One matter of importance which the members are asked to keep in mind is that of the appointment of G. F. Frankland as permanent secretary for three months, and those who desire to communicate with him personally will find him on duty at the permanent office, 507 Canadian Foresters' Hall, 22 College Street, Toronto between the hours of 2 and 5 p.m. each day except Saturdays and Sundays. Phone North 1879.

At other times he will be on hand at 1093 Bathurst Street. Phone Hillcrest 2022.

PNEUMATIC WATER STORAGE AND SUPPLY

(Continued from page 23.)

and 50 gallons respectively, according to the method of pumping; so the total capacity of the tank must be

$$\frac{100 \text{ units} \times 200 \text{ gallons}}{66\ 2/3 \text{ units}} = 300 \text{ gals., and}$$

$$\frac{100 \text{ units} \times 50 \text{ gallons}}{66\ 2/3 \text{ units}} = 75 \text{ gallons}$$

respectively.

In case II., water was run in to compress the air to 34½ lbs. absolute pressure, and the air then occupied $\frac{15}{34½} \times 100 = 43½$ units and water 56½ units. The tank was afterwards filled to 66 2/3 units. The difference between 66 2/3 and 56½, namely, 10 1/6 units, represents the available storage; so

$$\frac{100 \text{ units} \times 200 \text{ gallons}}{10\ 1/6 \text{ units}} = 1{,}974 \text{ gals. and}$$

$$\frac{100 \text{ units} \times 50 \text{ gallons}}{10\ 1/6 \text{ units}} = 493 \text{ gallons}$$

respectively total capacities of the tanks required.

It would, of course, be a simple matter to build up a table giving the capacity factor for practically all conditions, and no doubt readers can do so by the formula given above.

To arrive at the economical condition in respect to the size of tanks required it would be necessary to consider the interest on the cost of installation cost of pumping, quantity and pressure of water required, maximum pressure when the tanks are two-thirds full of water, total capacity of the tanks, and the available storage capacity necessary under different conditions. This question is somewhat involved, and may be dealt with later on.

The volume of air and water at different initial pressures are shown in the diagram appearing on page 23.

The air contained in the tank is gradually absorbed by the water and lost by minute leakages. It is stated that rain or soft waters absorb more air than hard waters. It is, therefore, essential that means must be provided to replenish the air, and this is done in different ways.

PRACTICAL SANITARY SCIENCE

(Continued from page 19.)

ferable to pump out enough so as to remove at least a part of the quantity originally present in the well and thus allow a fresh supply of ground-water to flow in; although in cases of surface pollution the withdrawal of the water in the well diminishes the amount of polluted matter. If sample is taken from a surface supply, the bottle should be plunged beneath the surface before removing the stopper, so as to prevent the entrance of dust particles and other floating impurities. Care should also be taken not to draw the sample from too near the bottom.

For a bacteriological analysis still greater care must be taken in order to secure a representative sample; and also to lesson the changes that quickly occur in germ-life in water.

Every endeavor should be taken to exclude the influence of extraneous factors, and in a bacterial test these are much more numerous and exert a more pro-

New Sanitary and Heating Goods

IMPROVED KEROSENE FIRE POT

The Clayton & Lambert Mfg. Co., Detroit, Mich., have recently introduced to the trade their No. 221 Kerosene Fire Pot, illustrated herewith, which they claim embodies many improved features in construction. The burner is made with a powerful generator that superheats the kerosene gas before it is burned and which, the makers claim, is remarkable in heat producing qualities, burning little fuel and producing a clear blue flame, free from smoke and odor. All parts are made of the best metals

Clayton & Lambert No. 221 Fire Pot.

and are strong and can be easily cleaned, should they become clogged from impurities in the fuel. A cleaning needle is supplied free. The large automatic brass pump quickly produces all needed air pressure for operating. The pressure can be released when desired to extinguish the flame by means of the air valve screw in the filler plug. The tank is of heavy gauge welded steel and is said to be practically indestructible. An adjustable wind shield makes the fire pot excellent for all outside work in bad weather as well as for use indoors.

CLARK THERMOSTATIC VACUUM VALVE

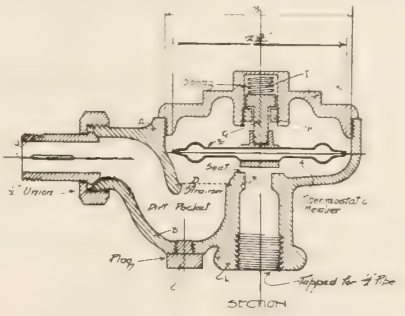
Another new Steam Radiator Trap has been put on the market, known as the Clark Thermostatic Vacuum Valve patented and manufactured by the W. E. Clark Company, Toronto.

Among the features for special mention in connection with this valve are the dirt pocket and clean-out plug situated between the steam inlet and the steam outlet, which allows all dirt or sediment to be thoroughly removed from the system, without entering the valve proper or causing any disarrangement of the thermostatic member. It can be thoroughly blown through and cleaned without the valve being disconnected from the radiator, or the radiator or trap in any way disarranged.

The Thermostatic Member is arranged with a spring tension on the upper side which prevents the member from rupturing under a continued flow of steam, as it will take up on the spring under continued expansion rather than rupture the member, which it is claimed, is liable to occur were the upper post fixed solidly in the cap of the valve.

The Action of the Valve

When the steam enters the radiator it drives the air ahead of it, which enters the Vacuum Trap at the point J, passes through the Dirt Pocket and Seal (B,) through the Strainer (D) and out into the return (Fig. F.) The condensation follows the same course. When the steam reaches the Radiator Trap it strikes the Thermostatic Member, the Member seals itself on the seat (F,) retaining the steam in the radiator and not allowing it to waste away in the return line. As the steam in the radiator condenses and turns into water, this condensed water flows into the Dirt Pocket or water Seal (B,) forming a separate seal. This water of condensation in the Dirt Pocket or Water Seal (B,) being lower than the rest of the condensation in the radiator tends to chill off faster and in turn causes the Thermostatic Member to contract. This



New Clark Vacuum Radiator Trap

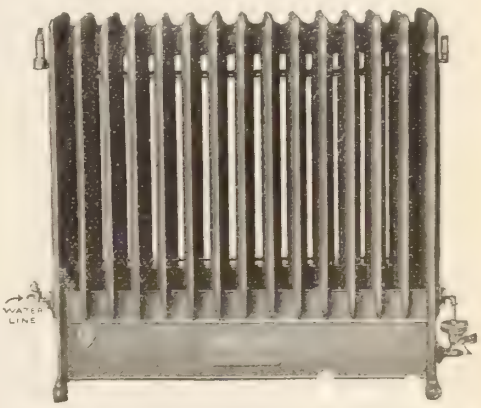
repeats the operation of opening and closing of the Thermostatic more rapidly and thus clears the radiator of condensation much faster than in the ordinary valves, which is greatly to be desired. The Thermostat in this radiator Trap may be adjusted readily by operating the set screw (H,) so that the distance that the Thermostat has to travel to seat (F,) may be increased or reduced according to requirements.

It is made of all brass, and is nickel plated, neat and attractive in design, efficient, durable and sensitive in its operation.

A descriptive bulletin illustrating the Trap is published and may be procured from The W. E. Clark Company, 28 Adelaide St. West, Toronto.

A NEW STEAM RADIATOR

Another new type of radiator is now on the market which is heated by gas. It is called the Franklin Steam Radiator, and is being manufactured by the Franklin Co., Canton, Ohio. Several very novel claims are made for this



New Franklin Gas-heated Steam Radiator

radiator, in that no boiler or heating pipes are required. A small amount of water is placed in the radiator, which in turn is converted into steam by the use of gas. As the steam condenses by radiation, the water falls to the bottom of the radiator, is again made into steam, and so on.

The heat of the radiator also automatically controls the gas consumption, which is claimed to be very low, and much cheaper in the end than any other fuel.

Further particulars may be procured by writing to the above-named company.

A REFLECTION UPON THE TRADE

(Continued from page 25.)

is about a couple of inches of water in it, place some on the gasoline fire pot, raise steam and direct the flow of steam to the pipes frozen.

These fires are nothing but sheer carelessness and are a reflection upon the trade as a whole.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

WHICH IS PROPER PLACE FOR RADIATOR, AND WHY?

Editor The Sanitary Engineer:

The proper place in which a radiator should be placed has been discussed between several members of the trade in our town recently, and one of my customers and myself have been placed on the defensive. One member of the trade has installed quite a number of radiators in all manner of locations, and apparently the rooms in which the radiators are located on the centre of the inner walls are not warm enough.

I was called in and stated that no radiator should be placed on the inner walls, but rather either under windows or on an outside wall. I don't really know why I made this statement except that I've always made a practice of placing all radiators in such locations. Will you please show what is right, in an early issue of The Sanitary Engineer.

A Steam and Hot Water Fitter.

The proper location for all radiators is the coldest place in the room. Under windows or on outside walls. If any one has ever sat near a window or outside wall on a winter's day, they would experience a feeling almost like a draft. This is the cold air coming in either through the glass or wall, and if a radiator is placed there this cold absorbs the heat, and all becomes suddenly warmed.

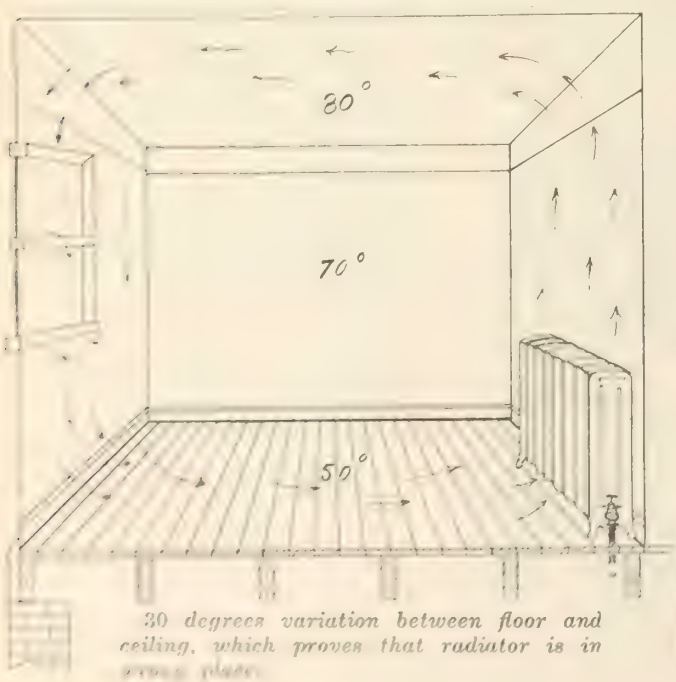
The heat begins to travel and will circulate all round the room. Fig. 1 will illustrate in a very simple manner what actually takes place. Here is a room with radiator placed on the inside wall. The cold strikes the glass, falls to the floor, travels along, or rather is drawn along by the upward motion of the heat waves from the radiator. This air is partly warmed, travels up as shown by arrow marks, drops at the coldest part, and forms a regular circle. The floors are always cold with little or no movement in the centre of the room.

Fig. 2 changes this condition. The radiator is placed at the window, hot waves rise and form a warm curtain, keeping out the cold air, as well as creating irregular heat waves which break up throughout the whole space to be heated.

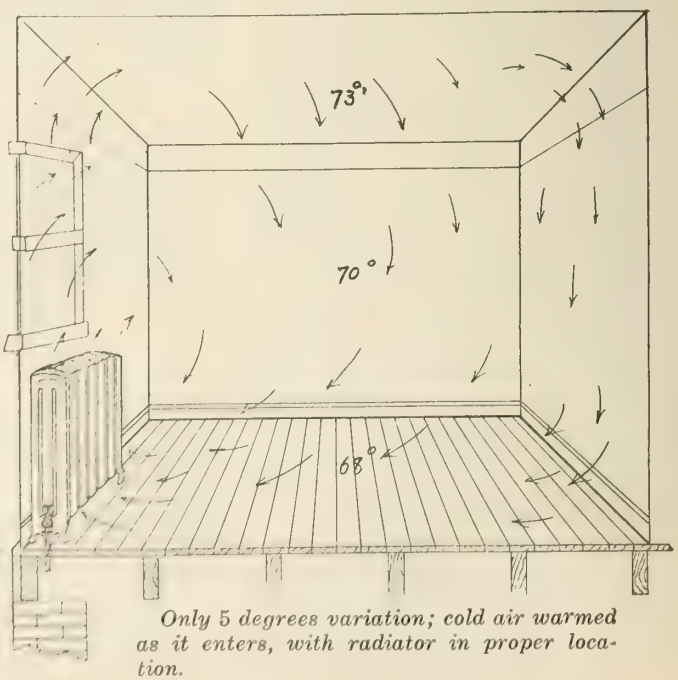
A radiator placed in the most exposed part of a room not only warms the room but keeps out the cold air.—Editor.

THIS CHEF MISSED HIS NATURAL VOCATION

THE country hotel was heated by hot water. The country mechanic who had carried out the contract placed two valves to each radiator. One day the chef closed the valves on the radiator and left his bedroom window open: result, a badly-cracked radiator. Of course, the two-valve job had nothing to do with this accident. The proprietor told the chef that he could pay for a new radiator or sleep in a "radless" room.



30 degrees variation between floor and ceiling, which proves that radiator is in wrong place.



Only 5 degrees variation; cold air warmed as it enters, with radiator in proper location.

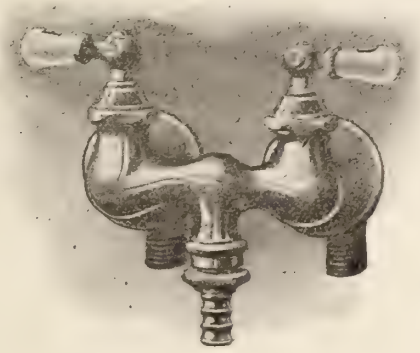
ARE YOU BUYING FOR PRICE ?

IF YOU ARE, YOU CANNOT COMMAND QUALITY

No line of brass goods require to be as dependable as those which go into the bathroom. Many a low-priced bath-cock has cost from $50.00 to $100.00 in damages and water waste.

We have to maintain our price to ensure quality. Every dollar we have is behind the goods we sell.

MUELLER



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"We are building up a splendid business on quality brass goods Every dollar we spend with Mueller's is like putting money into the bank with compound interest.

"WE NEVER HAVE TO GO BACK TO REPAIR MUELLER RAPIDACS."

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H. Mueller Manufacturing Co., Limited

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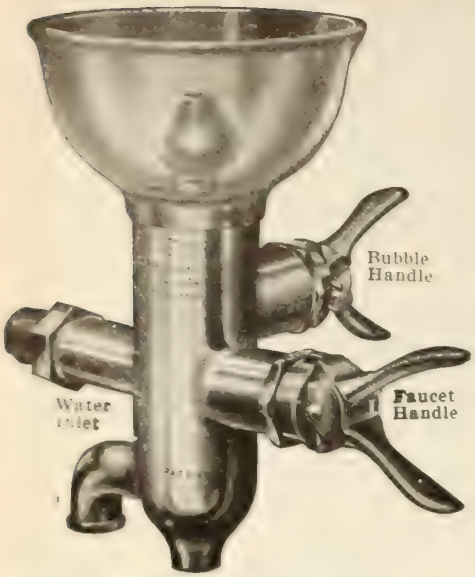


Saving or Wasting?

The manner in which you handle the drinking water problem in your plant may seem to be a small matter to you—but investigate. The results will be surprising.

The old-time faucet is costly. Running hour after hour, day after day, its ceaseless flow is costing you money, yet without any better service.

Puro Saves 35%

A Puro Sanitary Drinking Fountain will cut that water bill 35%. We can prove that it has done that for others.

It will give every employee a safer, saner draught of bubbling water free from the contamination of the common drinking cup.

[illegible] is the only sanitary Drinking Fountain that is really safe, sanitary, simple, automatic in control, [illegible]

"PURO - FY"

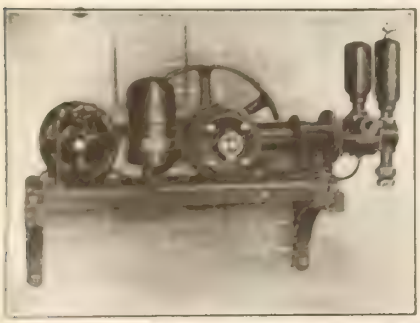
(MADE IN CANADA)

YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company

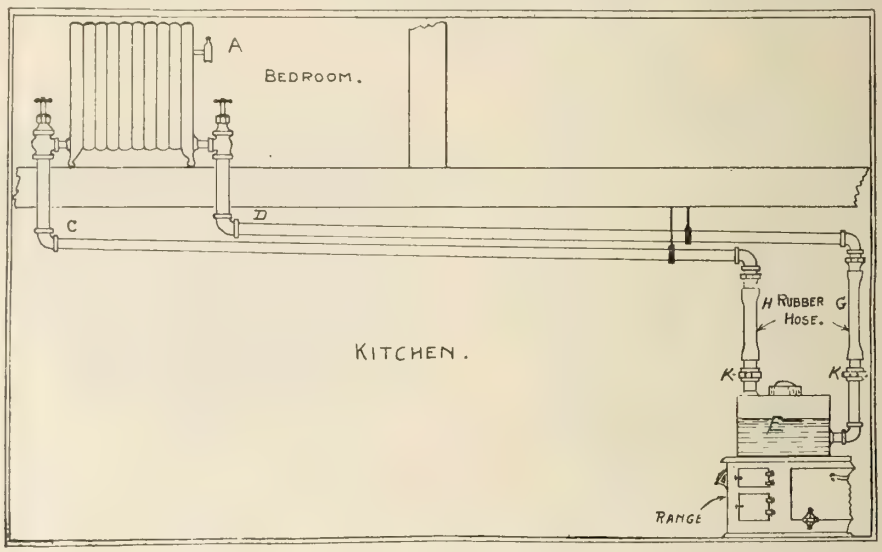
147 University Ave., Toronto, Canada

The Paul Electric Motor Pump



Every [illegible] should write to the Fort Wayne Engineering & Mfg. Co., Dept. 37, Fort Wayne, Indiana, and ask for Bulletin 107, which describes this motor pump for residence service.

Did he do either? I guess not. As there was no cellar at this part of the building the feed and return pipes passed across the ceiling of the kitchen. The chef secured the services of the country mechanic and had him cut the pipes and place a couple of elbows on the cut pipes above the range. He had tank E on hand made from heavy tinned sheet iron, the ordinary four-gallon tin used by certain dealers in hotel supplies. Again he called upon the country mechanic to solder a nipple on the top and one on the side to which he had attached the unions J and K. The pieces H and G are pieces of ordinary ¾-in. garden hose. B is an automatic air valve. During the day time the chef uncoupled the two unions and hung the garden hose pieces to one side. He also left his window wide open all day as he was a fresh air fiend.



Showing how a chef heated his bedroom with very little trouble.

Every evening after tea he coupled the job together again, placed about 2½ gallons of boiling water in the tank E, put on the cover F, which he had filled in with melted tea lead to make it heavy, and in 15 minutes the radiator in his bedroom was the hottest one in the house. The crack in it allowed a little steam to escape but not enough to do any damage. As the tank E was placed over the open range hole it gave off considerable steam and never wasted over a quart of the water in a night. About one minute's work in the morning was all that was required to uncouple the unions, hitch back the hose and lift the tank from the range for the day. He never closed the valves, but the job would have been better if they had been removed. However, the lead-filled lid would act as a safety valve. This yarn was told me by a friend who vouched for its truth. If it really is true, that chef deserves the title of expert heating engineer.

JAMES E. NOBLE,

999 Queen street West,
Toronto, Ont.

WHO AM I?

I am more powerful than the combined fighting forces of the world at the present day.

I have destroyed more men than all the wars of the world, and while I exist I will destroy more life than all the wars to come.

I am far more deadly than bullets or shrapnel shell, and I have wrecked more homes than the mightiest siege guns or the worst plague which ever existed.

I steal more money from the people in Canada in one year than would pay off her present national debt in five years. I spare no one, and I find victims among the rich and poor alike; the young and old; the strong; the weak; widows and orphans know me.

I loom up to such proportions that I cast my shadow over every field of labor from the turning of the grindstone to the moving of every railroad train.

I kill, and maim for life thousands upon thousands of wage earners in a year. I lurk in unseen places, and do most of my work almost in silence.

You are warned against me at every turn, but you heed not.

I am relentless, I am everywhere; in the home, in the field, on the streets, in the factories, at the railway crossings and on the sea.

I bring sickness, degradation and death, and yet few seek to avoid me. I am friend to no man not even to myself and wish I could destroy myself.

I am your worst enemy.

I AM CARELESSNESS.

What is efficiency? Is it not doing a thing in a clean, quick, competent way? Is it not doing a thing with the least expenditure of brain and force? Is it not doing a thing the way a thing ought to be done. Efficiency means effort; it means study; it means the development of our own powers; it means applying those powers to every task.

You can put a stop to faulty hot water systems by installing

The Knickerbocker Generator

It is a positive remedy that is easily applied to the open or closed systems of hot water heating.

Entirely automatic.

Connects with one-inch nipple to outlet of expansion tank.

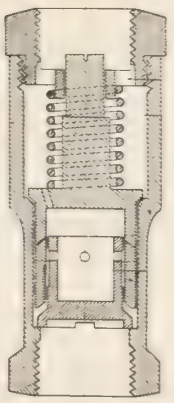
Makes a hot water system equivalent to a low pressure steam plant.

Increases radiation from 25 to 30% with same firing.

Reduces the size of pipes and fittings.

Temperature of water can be varied up to 250 degrees.

A top-notch profit producer.



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Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO
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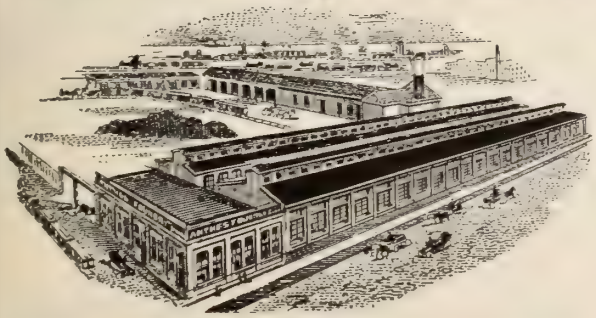

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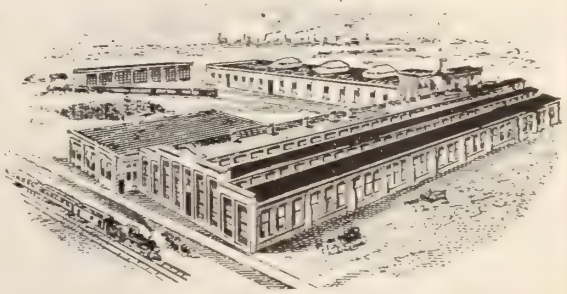

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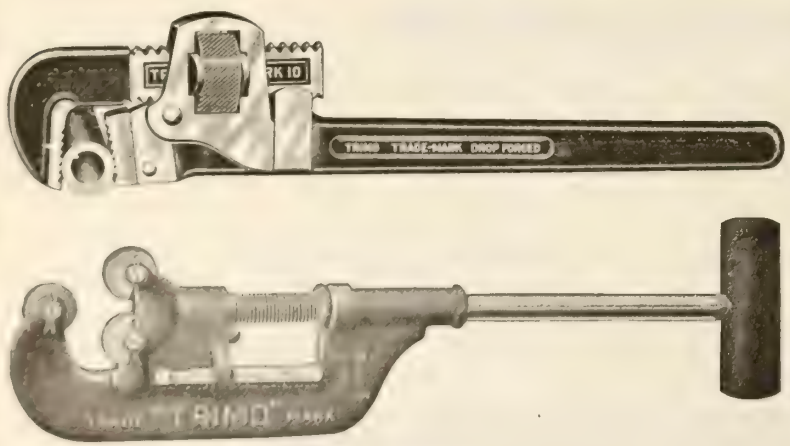

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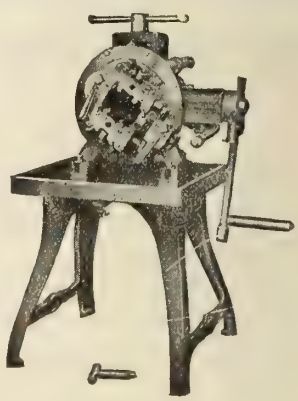
The Hotstream Heater Co. - Cleveland, Ohio

ONE NO. 56 "FORBES" PATENT PIPE Machine taking 2½" to 6" Pipe, with Right Hand Dies, regular cost price $242.00, sale price $125.00, usual terms. This machine has never been used. The James Morrison Brass Mfg. Co., Ltd., Toronto. (2)

WANTED—COMPETENT ASSISTANT FOR heating engineer. Must have had experience in laying out and designing heating plants. Permanent position for right man. Good opportunity for advancement. Apply Steel and Radiation, Limited, Fraser Ave., Toronto. (3)



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PIPE MACHINES

Either Hand or Power

This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
A time and labor saving machine.

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ALSO NIPPLES Black and Galvanized All Sizes

Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED
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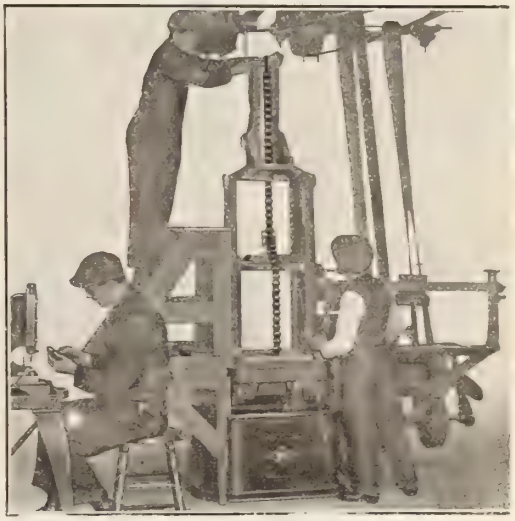
Danger to Life or Limb lurks in the hidden flaw of an untested chain. If you sell chain pipe wrenches, use them or assume responsibility for the safety of others who use them—no feature is so essential as their

DEPENDABILITY

All "Vulcan" and "Agrippa" Chain has withstood an actual test of two-thirds of its breaking strain to make certain it was flawless.

J. H. WILLIAMS & CO.
77 Richards Street BROOKLYN, N.Y. CITY
The Wrench People



Williams' Tests are unique but desirable.

R. O. WYNNE-ROBERTS
Consulting Engineer
310 TEMPLE BUILDING, BAY STREET
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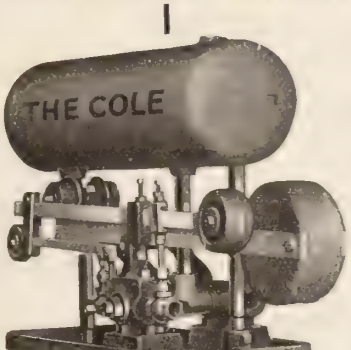
Water Supply, Sewerage, Sewage Disposal, Civic and General Engineering, Arbitrations, Investigations, Valuations, Reports, etc.

COLE DIRECT RETURN TRAPS



Are big fuel savers because they operate on 1-10th the steam that it takes to run a steam pump.

They work with the utmost in efficiency and reliability, and return condensation at any pressure.

Operate on roller bearings, on a fixed Fulcrum which permits of full discharge at each operation.

Mr. Steamfitter, why not get in touch with US?

GEO. W. COLE CO.
838 Dundas St., TORONTO

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500 Questions and Answers on Steam, Hot Water and Vapor Heating

By A. G. KING

A Book which every heating engineer should possess. Contains over 200 pages, is full of illustrations, some of which are entirely new, simply written, and complete.

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THE FINANCIAL POST OF CANADA

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Classified Buyers Guide

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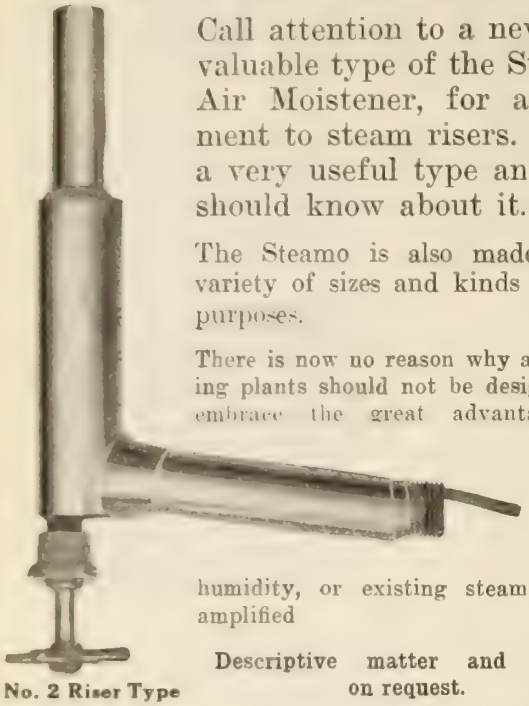
The Air Moistener Co.



Call attention to a new and valuable type of the Steamo Air Moistener, for attachment to steam risers. It is a very useful type and you should know about it.

The Steamo is also made in a variety of sizes and kinds for all purposes.

There is now no reason why all heating plants should not be designed to embrace the great advantage of humidity, or existing steam plants amplified

No. 2 Riser Type

Descriptive matter and prices on request.

The Air Moistener Co.
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Advice and Plans on
Water Supply and Sewage Disposal for Residences, Factories, etc.

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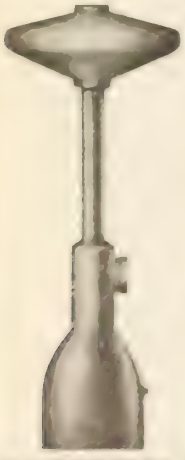
BOX 95. SANITARY ENGINEER TORONTO

The Safe Mercury Seal



The Honeywell Heat Generator—the only perfectly safe device for sealing a hot water system. No springs, weights, valves or movable parts—nothing but two open tubes joined at the bottom through which mercury and water circulates.

Dependable

It is impossible to stick or leak more than ten pounds pressure in the Honeywell Generator. It gives perfect satisfaction under all conditions and can be used for either old or new work.

Write for booklet "How to Properly Design and Install the Honeywell Method of Hot Water Heating." It is free.

HONEYWELL HEATING SPECIALTY CO.
Wabash, Indiana
Manufacturers of High-Grade Heating Specialties

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"Digest of the Mercantile Laws of Canada"

PRICE $2.50

At the recent convention held in St. John, N.B., the question of the lien law was discussed.

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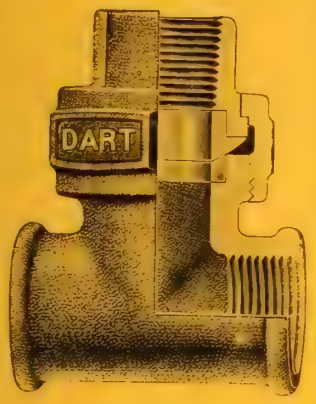


FIG. 1

For every one of these fittings used there is a saving of one T, one nipple or piece of pipe and two threads. The latter are possible leaks.

Save Time and Cut Out Leaks

These styles of **DART UNIONS** embody all the Dart Union efficiency—viz., they are bronze to bronze at the joint **(there is nothing to deteriorate)** and the heavy iron parts will not stretch or pull apart. They stay tight until deliberately loosened with a wrench, and are easily connected, whether pipes are in or out of line.

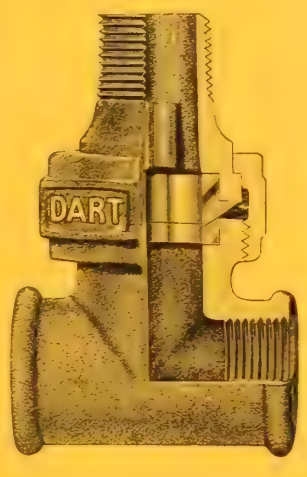
There are several fittings in one. On connecting up a range boiler, as few as two are used and possibly as high as nine, thus it may be necessary to carry 36 fittings for one job or eight for the first.

All jobbers sell them.

Dart Union Co., Ltd., Toronto, Ont.

On figure 2 you have to handle and stock one fitting instead of four. It is a real Four-in-one. Saves leaks and troubles.

FIG. 2



KERR GATE VALVES

NOW IS THE TIME to show your patriotism, and prove to yourself and others, that VALVES, made in Canada, are equal in quality and workmanship, to any made elsewhere in the World.

BREAK THE HABIT of buying foreign-made goods and get acquainted with Canadian Made valves, which you have perhaps imagined were not quite equal to the Imported variety.

This plant is at your service.
Help us keep it busy.

REMEMBER that every dollar spent in Canada for Canadian manufactured goods, means increased consumption of raw materials, and increased employment of Canadian labor.

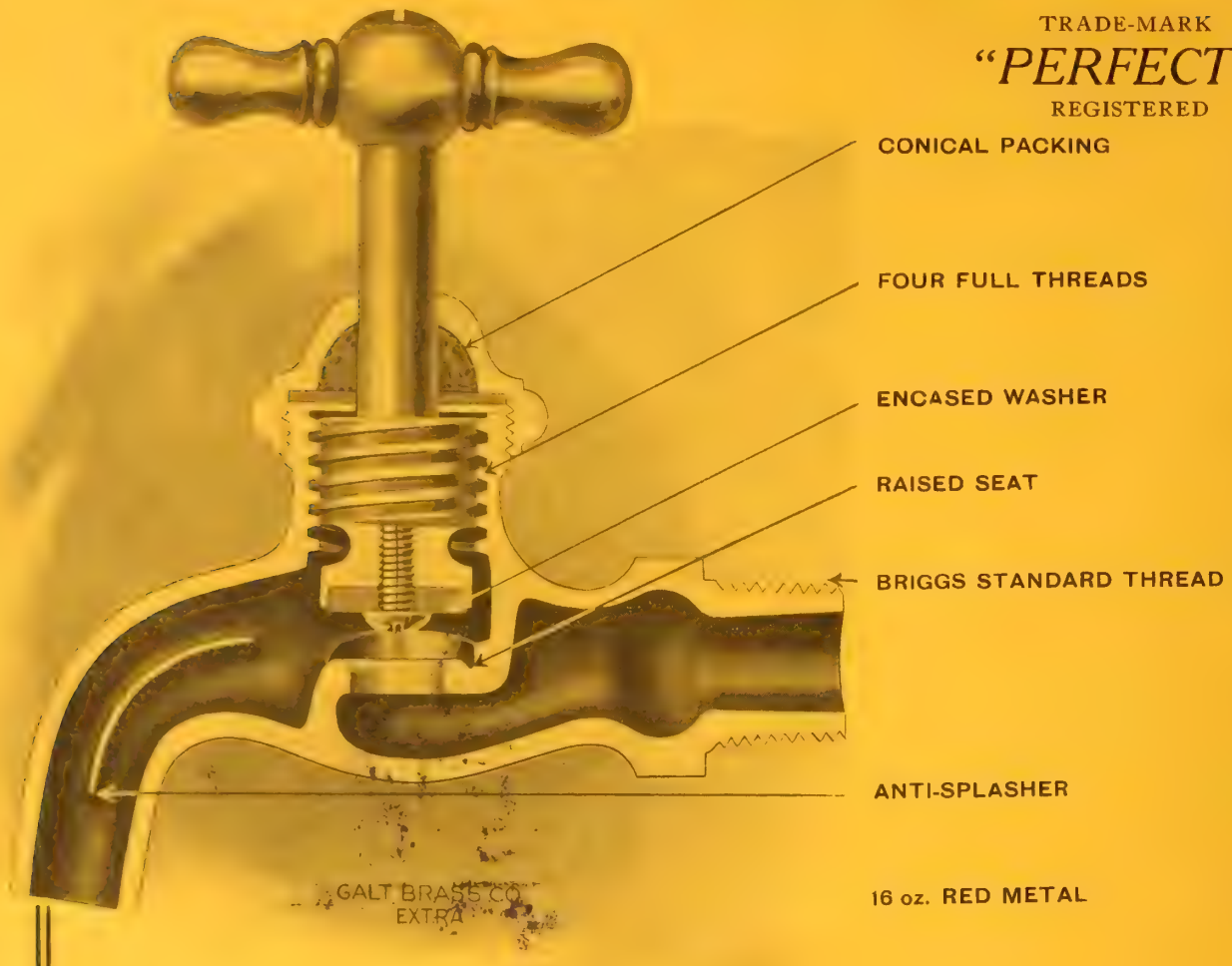
Quickest possible deliveries. Consistent Prices. Best quality of goods

Write for Catalog No. 5.

The Kerr Engine Company, Limited Walkerville, Ontario

Valves and Hydrants Exclusively

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER

PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol X. Publication Office: TORONTO, FEBRUARY 1, 1916 No. 3

Enameled All-over

VICTOR ONE-PIECE BATH

Enameled Inside

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FILE COPY

The principle of the Victor Bath is a tub body cast integral with a Base and Wing Plates: the latter in various positions on the Tub Body to make the various Combinations, viz.:

Open Type
Corner Type
Recess Type
End to Wall Type
Back to Wall Type
Also with Extension Rim at End or Back for fittings—thru rim.

PRICES ON REQUEST

The Standard Ideal Company Limited

General Offices and Factories: Port Hope, Canada

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Beaver Brand
Cast Iron Enameled Ware

Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability.

The above cut shows one of our many styles of lavatories.

These goods are very much appreciated by the trade.

Buyers who want the best, insist on **Beaver Brand Goods.**

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28 "Service" Branches throughout Canada

Canadian Consolidated Rubber Co., Limited
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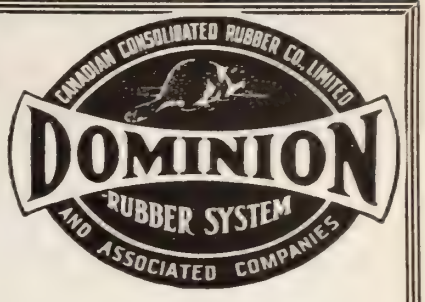

"The Higher Cost of Paying Less"

There are two costs to every article—*purchase* cost and *service* cost. One gives you ownership. The other gives you results.

And an article is of value only in proportion to its ability to give *Service.*

This applies to rubber goods, as well as to all other merchandise.

Our line-up is complete, our quality is unexcelled, and our prices are right. Let us show you what we can do.

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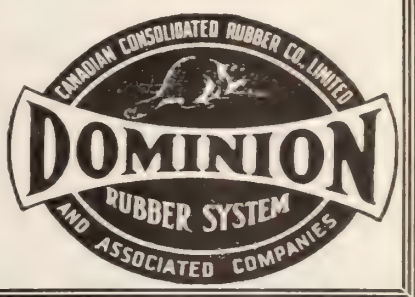
Canadian Consolidated Rubber Co., Limited
MONTREAL, P.Q.

28 "Service" Branches throughout Canada



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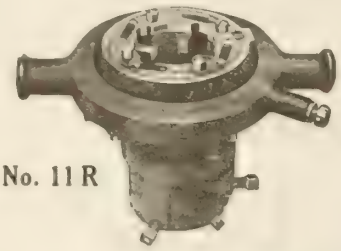
Reduce the labor of pipe threading 50 per cent. and make threads as clean and perfect as if cut on a Lathe with only ONE cut.



No. 11 R

"Jardine" Adjustable Ratchet-Threading Tool

Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely enclosed, excluding chips and dirt.

"Jardine" or "Toledo" dies spare the muscle of the man who does the work, and save money for the man who pays the wages, as they enable one man to do the work of two and cost less for repairs. No cams or jimcracks to wear and get out of order. Cutters that cut, don't squeeze. Set of cutters for each size of pipe. Lead screw ensures perfect pitch and form of threads. Adjustable to all variations of fittings, very durable cutters.

IS NOT A TOOL LIKE THIS WORTH YOUR CLOSEST INVESTIGATION?

We'll be pleased to put you in touch with users and send catalog. Write!

All threads finished at one cut. One man does the work of two.

MADE IN CANADA

A. B. JARDINE & CO.

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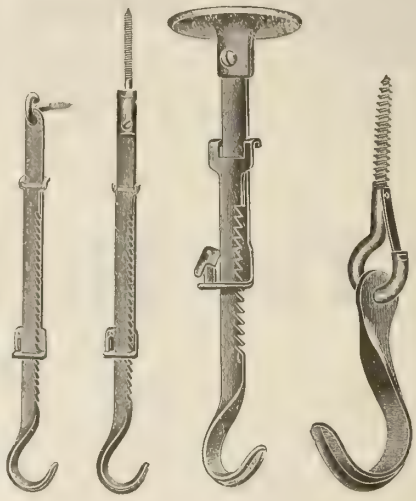
Malleable Iron Hook Hanger

Instantly Adjustable



A B C D

to any pitch wanted. Simply throw back cam and adjust as desired.

Can be furnished with extension pieces up to 10 ft.

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New Britain, Conn.

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Bulletin No. 11

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Full information can be had on request.

The Consumers' Gas Co. of Toronto

12-14 Adelaide St. W. **Phone Ade. 2180**

There Can Be No Mistake in Choosing the

DAISY BOILER

Over 55,000 Daisy Boilers are now in daily use, and every one giving complete satisfaction.

The house that is heated with a Daisy is well heated.

Easy to install—Easy to operate.

Easy to clean—Economical in fuel consumption.

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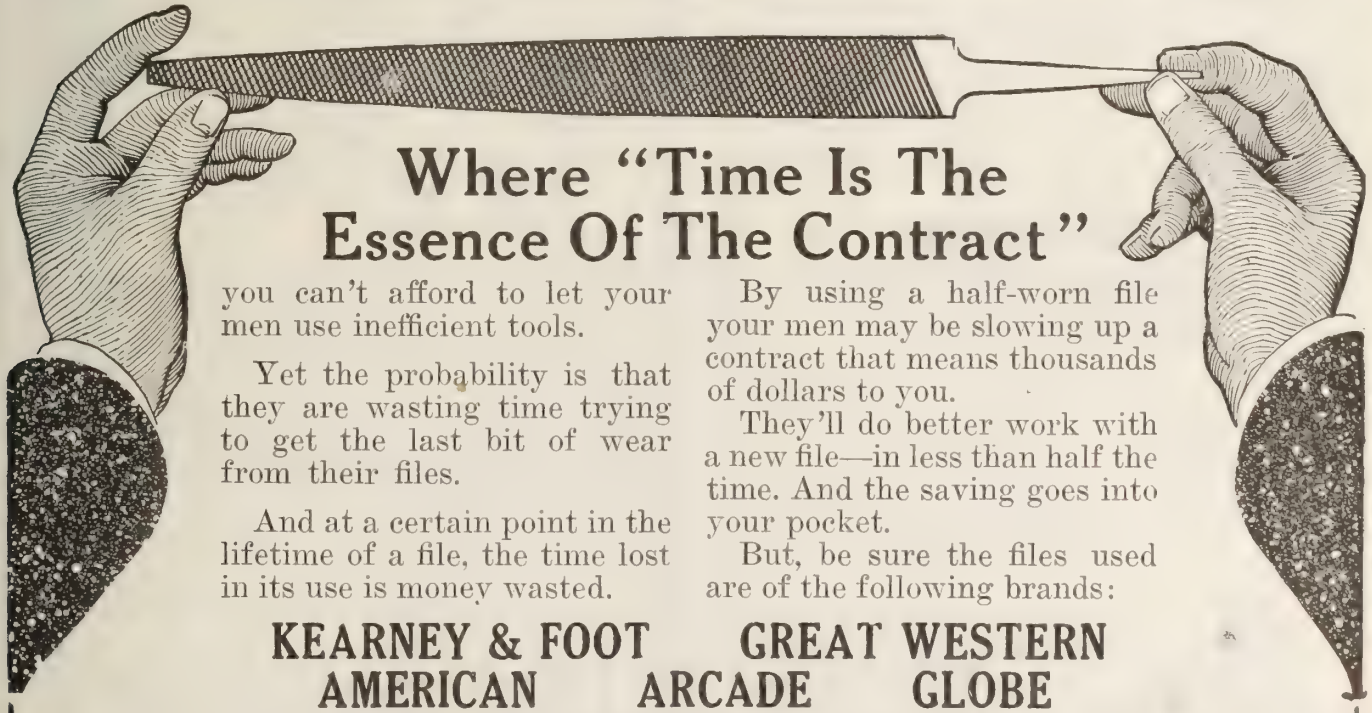

Where "Time Is The Essence Of The Contract"

you can't afford to let your men use inefficient tools.

Yet the probability is that they are wasting time trying to get the last bit of wear from their files.

And at a certain point in the lifetime of a file, the time lost in its use is money wasted.

By using a half-worn file your men may be slowing up a contract that means thousands of dollars to you.

They'll do better work with a new file—in less than half the time. And the saving goes into your pocket.

But, be sure the files used are of the following brands:

KEARNEY & FOOT GREAT WESTERN
AMERICAN ARCADE GLOBE
(Made in Canada)

The Files with our 50 years' experience at back of them. They last!
Write for our FREE copy of "File Filosophy."

NICHOLSON FILE COMPANY
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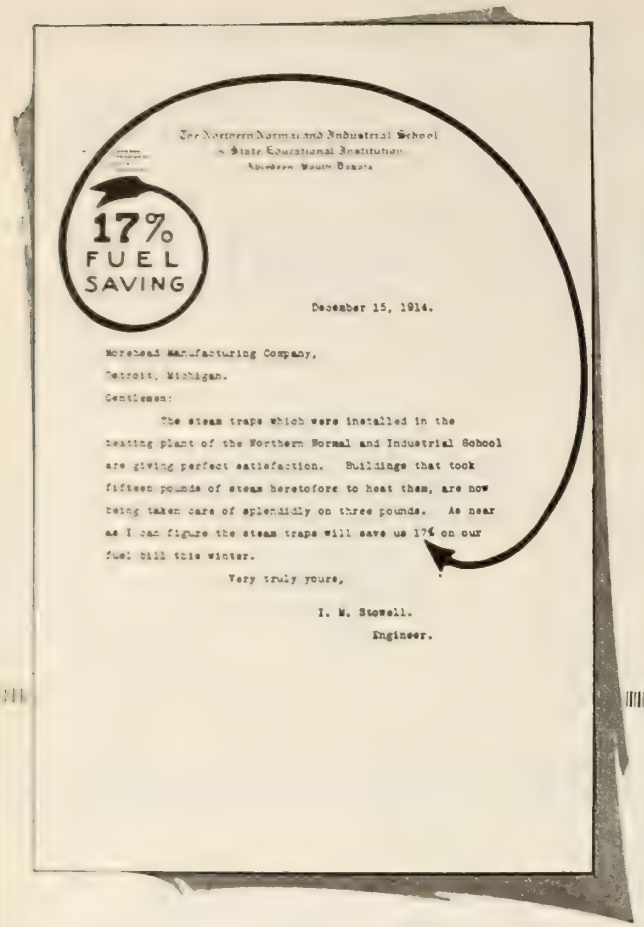
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A State Educational Institution
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Morehead Manufacturing Company,
Detroit, Michigan.
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Very truly yours,
I. M. Stowell.
Engineer.

"Buildings that took fifteen pounds of steam heretofore to heat them are now being taken care of splendidly on three pounds."

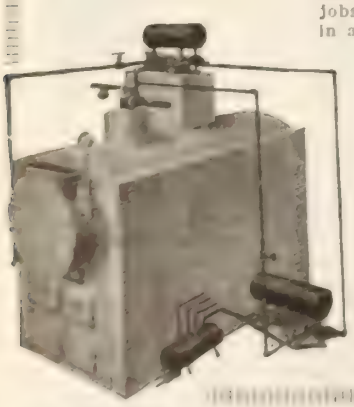
DO YOU GET the full significance of this statement? Do you realize what this installation of the

Morehead
Back to Boiler
SYSTEM

has meant in **convenience** — in **comfort**— in actual **money saving** to the management of this well-known normal school?

Far-sighted Plumbers and Heating Engineers everywhere are realizing handsome profits—and building lasting **good-will** by specifying the "Morehead" Back-to-Boiler System on **all** jobs involving the use of steam in any way.

Write for the Back-to-Boiler Book Today



Get acquainted with this epoch-making equipment at once. For complete details simply address

Canadian Morehead Manufacturing Co.
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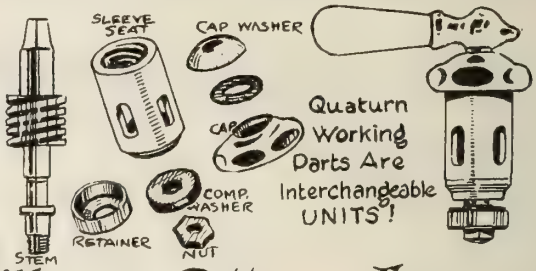
Just Compare The Celebrated SYDENHAM BRAND Quaturn

"OPENS WITH A QUARTER TURN CLOSES WITH THE PRESSURE"



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FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

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SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN

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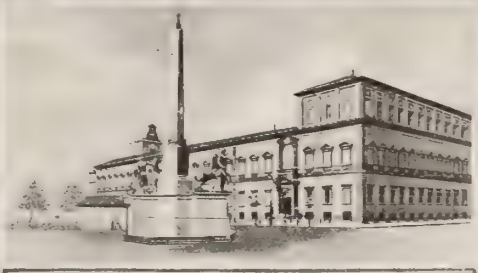

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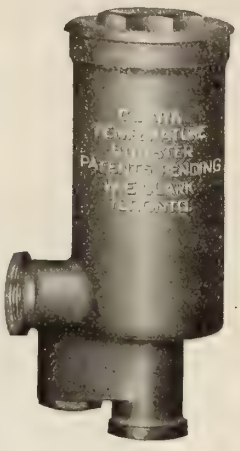

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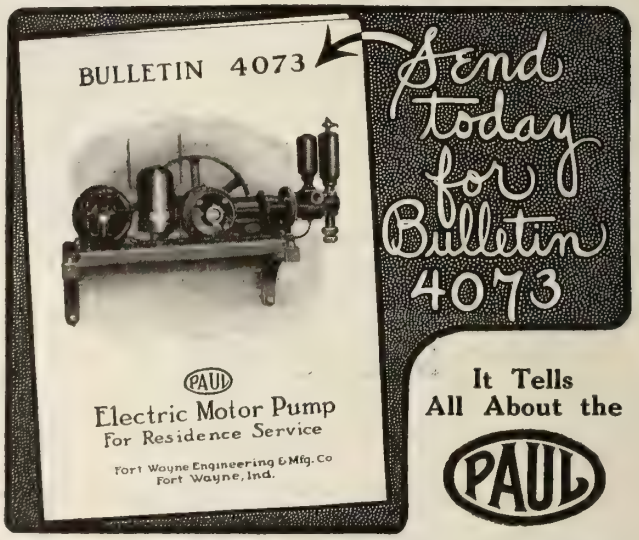

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SANITARY ENGINEER
PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, FEBRUARY 1, 1916 No. 3

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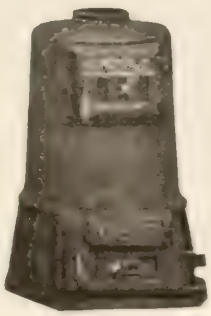

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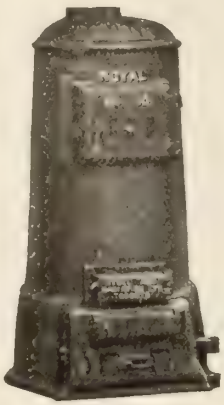

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THE SANITARY ENGINEER

VOL. X. FEBRUARY 1, 1916 No. 3

"Sales Talks" With the Craft

A Series of Articles Which Will Show How New Business Can be Created and is Being Gotten by Adopting Such Suggestions as Are Related From Time to Time

By W. D. STOCKS

"THE whole town seems to be suffering from a severe dose of the grip just now" said Fenwick as he entered my office the other day. The facts are, we had been experiencing a spell of real jack frost 10 below zero, and in our town this temperature is about 8 degrees lower than usual, and all at once the thermometer went up to about 55 above freezing.

"Well," I said, "how do you account for the trouble? You seem to have as good a dose of the grip as it is possible to have. How did you get it?"

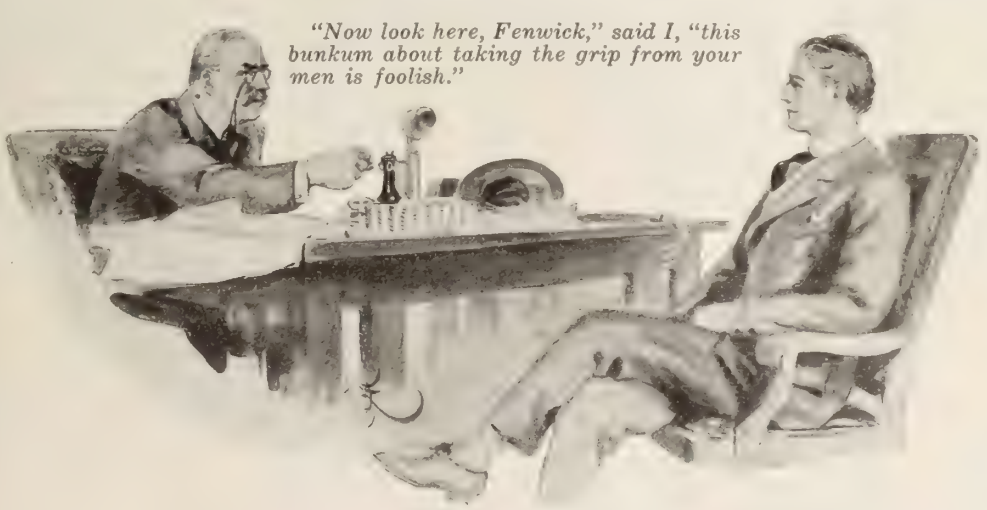
"Well Mr. Stocks I really don't know, unless I took it from some of my men, I've got three off work with it now. But as far as myself and family are concerned, we've a warm house, and I've not been out to get a cold." "Now look here, Fenwick," said I "this bunkum about taking the grip from your men is foolish. Do you know that unless your own vitality is run down you won't take cold or grip from your men at all. You've got to be run down yourself before such a condition could arise.

"You just said your house is kept warm. How warm do you keep it?"

"Well now, Stocks, I really don't know," replied he, "but its somewhere about 70."

"Somewhere about 70 eh? That may mean anything from 60 to 80, a mere matter of 20 degrees.

"I'll tell you what it is, Fenwick, you've been in business to my knowledge for over 15 years, and I've always had a great deal of respect for you. Now I'm going to just show you that if you have not got at least $15,000 in the bank or in good saleable stock-in-trade you've been running your business just as you're running the furnace in your home. You've no idea I'll bet, how much you are worth. Pardon me but if I did not feel so darned interested in you I would not talk to you as I am doing."



"Now look here, Fenwick," said I, "this bunkum about taking the grip from your men is foolish."

"Now look here, Stocks," he interposed "just you fire away, I came in to order a couple of baths, some ferrules, and a case of 1½ lead waste pipe. Here's the order, get it out for my man, he's going to call for it on his way to a job. Then let's settle down, I'm always ready to listen to you, and some day soon I'll spring a story on you which by the way brought me in over $100 profit and I got the hint from you, Stocks. Yet for the life of me I can't see how the deuce you can show me why I've got the grip and at the same time prove to me that I'm running my furnace in the same manner that I'm conducting my business, because I must frankly admit that I'm certainly not worth $15,000, I may be worth perhaps five or six thousand."

"Well, Fenwick, as I said just now, if you are not worth $15,000, you should be. And you break in and say you're sure you are not. I can see you've got the grip. You say you keep a warm house, etc. The facts are plain as daylight let me show you where you have been wrong. you have been in business for 15 years. You've worked hard, put all the energy you could into your business. What have you done all this for? To make money I suppose. To make money properly you should find out how much you want to make. For instance if you did $10,000 worth of business a year, you should make a certain sum clear profit, after all charges are paid against it.

"What percentage of profit did you decide, to, make, when, you, started, in business?" "Well now Stocks" said he "I really didn't take such a matter into account when I started, but what

the mischief has that got to do with me getting the trip or running my furnace? I don't owe you a cent, Stocks, except the regular monthly account, and while I may not know just how much or little I'm worth, I can pay all I owe and still have a few dollars ahead, that I do know."

"Fenwick my boy" I said "You told me to 'fire away'. If you will promise me not to get up in the air I will go on. You and I have been good friends for all these years, and when I say friends I mean more than mere debtor and creditor. I knew your dad before you were born and your mother and my sisters were schoolmates. So mind you this is a friendly talk." Well, Fenwick colored up and I could see he was a little ashamed at getting worked up. So I proceeded:

"When you started up in business you had a little bank account etc., you admitted just now, Fenwick, that you did not consider the question of profits, etc., etc. Now, let's get to the furnace question. Your've got a house which contains so many thousand cubic feet of space. That space has to be heated just as you have to eat to live. Very good. Now you have a coal bin, you have a furnace, you start to change the temperature from whatever it is outside to what you desire it to be in the house. What is that temperature to be, what profit am I to make?

"Now, just decide that with proper humidity, you should determine upon a proper temperature, that is 65 degrees. Having decided that 65 degrees is a proper temperature, you fire your furnace accordingly." "But how can I fire accordingly Stocks? I can and am attending to my furnace myself and mind you I know how to fire a furnace." "That's all right Fenwick I'm not saying you don't, but I'm sure of this that you can't possibly fire a furnace and get every unit of heat into your rooms which is to be had out of a ton of coal unless there is some set system adopted to control your furnace, so that a predetermined temperature can be maintained. Don't let us get away from the statements I made Fenwick, that unless you had a certain sum in the bank after 15 years in business you were running your furnace like you ran your business.

"You started in business with a certain amount of experience and cash. These are your coal, and your energy. The coal represents the heat you should be able to get out of it. And no matter what number of units you get out of it, they are in the coal.

"If you control your furnace in a proper manner you can get at least 90 per cent of the heat units out of every ton of coal you burn. If you conduct your business in the same way, that is, [illegible] your overhead charges and decide what profit you should make out of a certain volume of business, then you can bank on making that profit.

"If you do $100,000 worth of business and you have decided that you must clear 5 per cent., then you will have 5 per cent., providing you've conducted your business properly.

"The same with the coal bin. If you burn 10 tons of coal, and have your furnace under proper control you will have generated so many units of heat, and warmed your house to a given degree. But the main thing is you have not controlled your furnace properly, because you don't know exactly what temperature you have in your home.

"And that is why you've got the grip. You have been firing away to beat the band, 'just on purpose to keep warm,' and instead you've got cold. You've been running your business in the same way. You admitted that you did not know exactly how much you are worth, but you should know. There's nothing mysterious about it.

"Now look here, Fenwick, I want you to start and do two things. I want you to think of this matter of heat controlling in the light of good business management. Don't work like blazes for a chance success, get right down to brass tacks. That will ensure you a certain profit for your labors. Next, show every customer you have how he can control the temperature in his home. What is the use of letting him shovel coal into the firepot which has a certain number of heat units in it, 50 per cent. of which are being lost either by going up the chimney or overheating the house. It's about time we made friends of our customers, and showed them a few things.

(To be continued in next issue.)

TO REFINE NICKEL IN CANADA

Arrangements have been made between the Dominion government and the International Nickel Company whereby nickel will be refined in Canada by this company, which heretofore has been shipping its nickel ore and nickel matte from Sudbury to Bayonne, New Jersey. The International company will erect a refinery on the Atlantic seaboard.

Since the outbreak of the war the British War Office has been in close touch with the International Nickel Company and it is largely through the increased activity of this company's mines that the allies have been satisfied with this commodity.

Use of Nickel

The property of toughness which nickel imparts to steel has rendered its adoption for industrial purposes of expanding importance. Large quantities of plate were used in connection with the reconstruction of the Quebec bridge; the construction of the Manhattan and Queensborough bridges in New York city; the St. Louis bridge over the Mississippi; the Kansas City viaduct and bridge over the Missouri; the Emergency dam, locks and spillway in the Panama Canal, and in many other smaller structures. Nickel has entered into all sorts of railway materials, marine engines and propeller shafts, and a thousand and one lines of the manufacturing trades. Armor plate, protective deck plates, large and small guns, armor piercing projectiles, gun shields, etc., contain nickel, but they consitute a small portion of the market for the metal—German silver manufacturers, for example—cover a large field. In their products, copper-nickel and zinc form component parts. These alloys vary in their nickel contents according to their uses and to the whiteness and softness of the metal to be produced. They enter into hardware and plumbing supplies, tableware, dairy machinery, railway car fittings, electrical resistance materials, cartridge shells, bullet jackets and coinage, both in German silver and pure nickel. The non-corrosive qualities of pure nickel make it specially desirable for cooking, utensils, surgical instruments, and like purposes

INDUSTRIAL PEACE PREVAILS IN CANADA

A SITUATION which promised for a time to become serious has been brought to an amicable close by a notification from the Canadian Northern Railway to the Labor Department at Ottawa of the company's acceptance of the findings of the Conciliation Board, which recently passed upon the dispute with its locomotive engineers and firemen. As a result of this finding, employees on the Eastern Lines of the C.N.R. system secure considerable benefit in wage rates and conditions.

The acceptance of the award by the railway company leaves the industrial situation in Canada peaceful beyond all precedent during the fifteen years covered by the Labor Department records. Not one strike is reported as existing from sea to sea, and there is no indication of serious friction at any point, although Conciliation Boards at the moment exist at St. John, N.B., where the 'longshoremen are negotiating a new agreement with the ship-owners; and at Edmonton, where the street railway men are seeking a new agreement with the municipality.

Work continues peacefully at both points pending the investigations, and, as the dispute in neither case presents any serious difficulty, there is every reason to suppose the various boards will be able to effect working agreements.

Pneumatic Water Storage and Supply

Pointing Out the Governing Principles of the Pneumatic Water System—All Systems Should Provide For Furnishing Air to Replace Loss by Absorption—More Attention Should be Given to This Subject by Those Installing Pneumatic Water Systems

By R. O. Wynne-Roberts, Consulting Engineer, Temple Building, Toronto

IN the previous article reference was made to the absorption of air by the water and to the loss of air by leakage. Some writers maintain that the absorption of air by water is insignificant, and that there should be no leakage of air from the tanks. The fact nevertheless remains that the air cushion does by some means become diminished, and as the efficiency of the system depends upon the maintenance of the proper volume of air at the required pressures, it is desirable that suitable means should be provided to ensure such conditions. Incidentally, it might be stated that it would be well to impress upon those who have pneumatic water systems installed, and also on those who operate them, the importance of maintaining the proper air cushion at all stages of the water level in the tank.

When there is an attendant to operate such water supplies, it is possible to replenish the air at any time by simply pumping it into the tank. Air can be supplied by the water pumps or by admitting a small quantity with the water, so long as efficiency of water pumping is not a necessity. Another way is to pump water only and allow a quantity to fill a supplementary chamber and drive the air out of it into the storage tank. The Eureka air injector is a simple device. It consists of a small cylinder, in which a rubber ball rises and falls with the pulsation of the water supply. There are suitable air inlets and outlet valves at the top and a water connection at the bottom. When the water pump draws in water, it also draws down the rubber ball in the cylinder, and when the water is delivered from the pump into the tank the pressure causes the ball to rise again. Each time the ball falls it draws in free air, and when it rises, the air is forced out into the tank. This action takes place at each stroke of the pump, and it is stated that the air cushion is maintained in this way at or near the required standard. The makers, however, state that this injector can be applied only to their own pumps. It is evident also that it would not answer where rotating pumps are used, because there would not then be the pulsation due to the inward and outward stroke of a pump piston. Another device is the Kewanee automatic valve, which floats on the water in the tank, and automatically opens and closes on air connection to the pump. It is well to point out that this appliance is fixed inside the tank, and is, therefore, inaccessible for adjustment until the tank is emptied, which is not always convenient or possible.

There are doubtless other ways of maintaining an adequate supply of air at the required pressures. The writer has studied the problem of automatically maintaining the air cushion at all stages of the water level in the tank, and is confident that it is possible to provide at small cost an arrangement for this purpose.

There is also the question of automatically starting and stopping the pump when the water has reached certain levels. There are many devices for this purpose where electric motor was used; but in the case of oil engines, the starting must be done by hand, but the stopping may be effected by different methods. If the clients desire automatically starting oil engines, it can probably be effected, in which case the pumping can be carried at more frequent intervals and the available storage capacity can be reduced.

In the foregoing articles the discussion has been in connection with domestic supplies. In the next the writer will deal with installations for institutions and small towns.

NEW DOUBLE SINK COCK

As every one knows necessity is the mother of invention, yet somehow or other the sink cock with proper provisions for tempering water has been a long time in making its appearance.

Thousands of pieces of china and glass have been cracked, fingers scalded, etc., all for the want of a mixing or tempering faucet.

J. J. Ryan & Co., of Chicago, has however, placed such a commodity upon the market which will no doubt be of interest to those who are on the lookout for new lines.

As will be seen this faucet, while fuller in type is more compressed in action. It has a swing neck enabling the person washing dishes to distribute water over a wide range of articles.

Further particulars may be obtained by writing to J. J. Ryan & Co., Monroe and Jefferson street, Chicago.

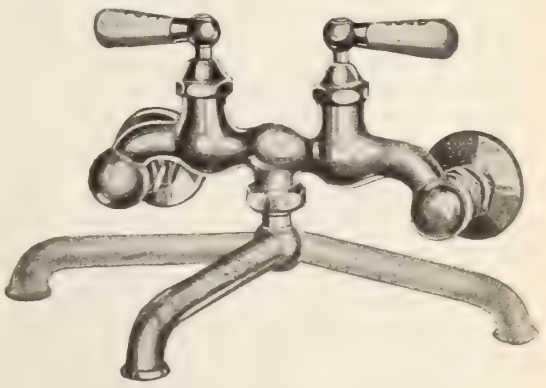
HOW TO DIG

When the Suez Canal was dug many of the workers were girls, who dug up the sand with their hands. Every girl digger filled a little rush basket which she had woven for herself. Then she lifted the basket upon her head, carried it one hundred feet up the bank and emptied it.

When the Panama Canal was dug, the digging was done almost entirely by steam scoops, each lifting two or more cubic yards of dirt at a single stroke. These scoops lifted the earth and dumped it into freight cars, each car holding 60,000 lbs.

The contrast between these two methods of digging is one which every British business man should notice. In the case of the Suez Canal the cost for equipment was practically nothing. Each girl provided her own basket, which had cost her nothing but a little labor.

In the case of the Panama Canal, the cost for equipment was extremely high. Steam scoops are expensive. So are freight cars and locomotives. Yet the cost of digging the Suez Canal was far more per cubic yard than the cost of digging the Panama Canal. In fact, an engineer has estimated that the cost of hand labor in digging is 1,000 times greater than the cost of digging by machinery.



Quic-Flo Water-Tempering Faucet

Moral—Get the best equipment if you want to reduce your costs.

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 21

WITH regard to the care to be taken in collecting samples of water for examination, part of a quotation from "Public Water-Supplies" was given in last issue. That part of the quotation that deals with samples for bacteriological examination is as follows:—

For a bacteriological analysis still greater care must be taken in order to secure a representative sample; and also to lessen the changes that quickly occur in germ-life in a water.

Every endeaver should be taken to exclude the influence of extraneous factors, and in a bacterial test these are much more numerous and exert a more profound effect than in chemical work.

In a surface water the influence of land contamination should always be considered. Samples taken from a stream after a rain where any turbidity has been produced will not be representative of normal conditions. In taking samples from wells the pump and pipes should be thoroughly washed out as bacterial growth generally occur in water standing in the same. Preferably, bacterial cultures should be made immediately after the sample of water is secured, as a marked change occurs in the germ content of water stored for a period, especially if temperature is rather high. This multiplication is less in tightly stoppered glass bottles than in those closed with cotton and is less in full bottles than in those partially filled. To lessen these changes as much as possible where it becomes necessary to transport samples any considerable distance, they should be packed in ice, in which condition growth will be greatly retarded. Not infrequently in samples so treated there is a diminution.

When conditions are favorable the bottles for collecting samples should be rinsed with the water to be tested as in the case of water from a tap or well. The bottles should not be completely filled but a bubble of air left for expan-

Time Between Collection and Analysis.

The sooner the samples can be sent away for analysis the better. Samples for bacteriological analysis should be kept [illegible] until tested. If to be kept six hours or more the bottles should be packed in ice. If the analysis cannot be made within twenty-four after the sample is taken it will be of very little value.

The allowable time that may elapse between the collection of a sample and the beginning of its analysis may be given for average conditions as:—

Physical and Chemical Anaylsis

Ground waters	72 hours
Fairly pure surface waters	48 hours
Polluted surface waters	12 hours

Microscopical Examination

Ground waters	72 hours
Fairly pure surface waters	24 hours
Waters containing fragile organisms	Immediate examination

One point that is generally made by writers on the subject of water analysis is that the analysis of only one sample may be of little value and that samples should be taken on different periods. The comparison of these different samples frequently furnishes more valuable information than the analysis of the sample itself.

To one who has been following the foregoing articles it is apparent that when untreated sewage finds its way by any means into drinking water, infection, and most particularly typhoid is almost sure to follow as a result of drinking such water. It has been stated that our senses, assisted if necessary by an ordinary microscope, may in some cases furnish ready proof that sewage has gained its way into a water supply. Yet in a great many cases where there is no objectionable taste, odor or color there are, however, enough typhoid "germs" or bacteria present to infect all the consumers of such water. A sanitary inspection may lead one to suspect the water supply and sanitary analysis, chemical but particularly bacteriological, are the final tests.

It might be said that a chemical examination furnishes circumstancial evidence of sewage pollution while a bacteriological examination furnishes direct evidence. Neither examination discovers the typhoid bacillus but where there is sewage in which there is human excreta, there also will be typhoid bacilli. This is a rule that has very few exceptions.

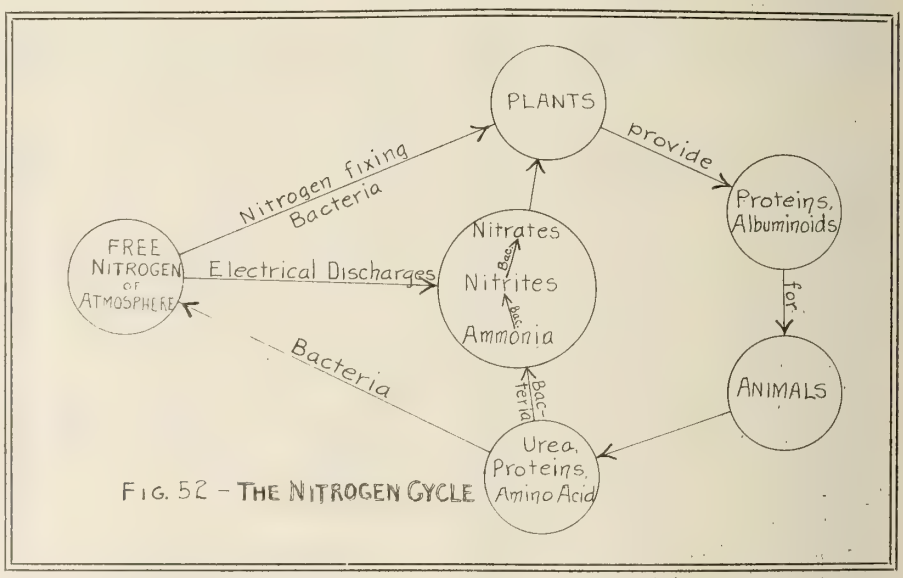


FIG. 52 – THE NITROGEN CYCLE

The food we eat is in general composed of different combinations of Carbon, Hydrogen, Oxygen and Nitrogen, some sulphur and mineral salts. In digestion the food undergoes a change and part is absorbed into the system to build up the body. In the excreta from the body will still be found all the elements that entered into the composition of the food but in less quantities and in different combinations. There are also millions and millions of bacteria ejected in the excreta. Some are dead, some are typhoid and disease bacteria but large numbers of ordinary bacteria remain alive and cause fermentation and putrefaction of the organic matter in sewage. When plenty of air is available the aerobic bacteria that need oxygen are able to oxidize the organic matter,

producing few or no objectionable odors. Evidently it is desirable to have plenty of air for the treatment of sewage. If the sewage is shut off from fresh air, the anaerobic bacteria, which do not need oxygen, cause putrefaction in decomposing the organic matter of the sewage. When small amounts of sewage flow into fresh, running water the first oxidizing process occurs but when the amount of sewage is too great to be oxidized and all the oxygen in the water is used up, objectionable putrefaction results. When years ago the first sewage of the city of Toronto was emptied into the harbor it was taken care of and oxidized by the lake water. As it kept on pouring into the harbor in increased volumes the condition of putrefaction became the dominant one.

The foregoing is but an attempt to explain simply, and in a few words, what is in detail a very complex and in some of its phases, none too well understood matter. The same few chemical elements are present in appetizing food and in objectionable sewage, in our bodies and in the soil, the difference being that they are in different combinations and in different amounts. Nitrogen is very important in organic nature. Fig. 52 shows what may be termed the Nitrogen Cycle. Starting with the free Nitrogen of the air of which it forms about four-fifths by volume, the diagram shows how, largely due to bacterial action, plants get their nitrogenous food from the soil (generally in the form of nitrates). The plants are eaten by animals and then the excreta acted on by the bacteria gives up free nitrogen to the air again or forms different nitrogen compounds eventually in the form of nitrates. Somewhat similar but not so complex is the way plants get their carbon from the carbon dioxide in the air and the eventual return of carbon dioxide to the air and soil.

Now, it is well to emphasize again the fact that what makes sewage dangerous is the disease bacteria. Where only small quantities of sewage get into a drinking water the amount of even putrefying organic matter that one would drink, while it is not recommended, would not of necessary be unhealthy if no disease bacteria were present.

It is now necessary to relate the foregoing information to the chemical examination of a water sample. It has been seen that the composition of sewage due to bacterial action changes as it becomes oxidized or further reduced. A chemical examination of a water sample polluted with sewage will show the chemical composition, which is an indication of the amount and kind of organic matter present. What we know as pure drinking water is not pure chemically. It contains certain salts in solution and as a matter of fact we much prefer it in taste on that account to a chemically pure water. Also, decayed vegetable matter may add to the water chemical compounds similar to those found in sewage. A chemical analysis is therefore not in itself conclusive evidence of sewage pollution but is evidence indicating that a water contains or has contained organic matter. A sanitary inspection will generally show the source of the organic matter and a bacteriological examination furnishes the final proof.

To explain the significance of, and the meaning of terms used in a chemical examination, a typical sanitary analysis of Ottawa river water as determined by the City of Ottawa Bacteriologist, is given in part:—

Content	In parts per million
Chlorine	1.5
Free Ammonia	0.004
Albuminoid Ammonia	0.096
Nitrites	trace
Nitrates	0.055

The first point to be noticed is that the results of a chemical analysis are given in parts per million by weight. For example, 1.5/1,000,000 is the weight of chlorine found as compared to the weight of water examined. This is certainly a very small amount but so are all the quantities generally found in a water analysis and parts per million is a convenient way to record them.

Chlorine

In water which we drink chlorine is present largely in the form of common salt washed from the air or soil. Salt is also present in most of the foods we eat with the result that sewage is high in chlorine. It is therefore not always easy to tell whether the chlorine has reached the water from an unobjectionable source or from sewage. Further, if chlorine from sewage has reached a water supply it does not necessarily mean that disease bacteria are to be feared as the sewage may have been previously treated to kill all the disease bacteria, or sufficient time may have elapsed for them to die. In localities near the sea coast or near salt deposits a large amount of chlorine is to be expected. But allowing for all special cases, the chlorine test is a simple and comparatively reliable one; if only one chemical test were to be used it probably would be the one.

In the water of Lake Superior there is only present about one part per million of chlorine. In Lake Huron at Sarnia it increases, due largely to sewage pollution, to four parts. At Buffalo in Lake Erie it is ten parts and at Toronto in Lake Ontario ten parts. The increase in chlorine is principally caused by the chlorine of the sewage emptied into the Lakes. To show how the water in Lake Ontario at Toronto has been contaminated:—

In 1881 there were only 3 parts of Chlorine per million in the tap water.

In 1912 it had increased to 9.5 parts.

In this case the increase in chlorine clearly points out the fact that the water in Lake Ontario has been contaminated with sewage. The comparison of chlorine tests of water samples from the same locality but collected at various times furnishes valuable information.

Ground waters may ordinarily contain 6 to 8 parts chlorine while underground water may contain 50 to 60 parts per million. Ordinary sewage contains varying amounts of chlorine with an average of say, 140 parts.

In the case of the Ottawa water, an analysis of which has been given, 1.5 parts does not necessarily indicate sewage pollution. In ordinary cases when 10 parts or over of chlorine is found it may be considered proof of sewage pollution.

Free and Albuminoid Ammonia

Ammonia may result from the decay of plants and from other sources but it also is derived from the decomposition of organic matter in sewage. In the diagram illustrating the nitrogen cycle (Fig. 52), it is seen that by bacterial action ammonia is oxidized to nitrites and then to nitrates, in which latter form it can be used as a plant food. If still present in a water sample as ammonia the indication is recent sewage pollution. Free ammonia exists in the water as ammonia but what is referred to as albuminoid ammonia is the organic matter that contains nitrogen, which if treated in a certain chemical way, will be converted into ammonia and can be measured as such.

The amount of albuminoid ammonia in good drinking water is generally equal to or may be two or three times as much as the free ammonia. On the other hand sewage polluted waters generally contain more free than albuminoid ammonia. If either free or albuminoid ammonia is found to be very high, however, it indicates objectionable pollution. An English writer allows 0.1 parts per million of free ammonia as not suspicious for upland surface and rain water but for river waters not more than 0.05 parts. An American writer gives for a wholesale flowing stream the largest allowable limit as:

Free ammonia, 0.01 to 0.12 parts per million.

Albuminoid ammonia, 0.10 to 0.28 parts per million.

It will be noted that in the Ottawa river water analyzed, the free ammonia was 0.004 and the albuminoid ammonia 0.096 parts. In neither case is the amount of ammonia found, necessarily suspicious. In wholesome deep well

(Continued on page 23.)

Reduction in Rates Expected

Expected That an Announcement Will Shortly be Made, of a Reduction in Rates in Workmen's Compensation Act Tariff—Will Affect Many Branches of the Plumbing and Heating Business

IT is expected that an announcement of considerable importance to the plumbing trade will shortly be made by the Ontario Workmen's Compensation Board regarding a rate reduction. Several hundred Sanitary and Heating Engineers come within the scope of the Workmen's Compensation Act, which went into effect about a year ago, and which was fully explained by The Sanitary Engineer at that time.

The commission is busy at its new home in the Normal School Building, Toronto, Ont., compiling statistics which will form the basis for the current year rates. Employers are not taxed at random nor upon speculation, but according to the actual working out of the scheme. When the Act came into force the board made statements to the effect that should the tariff rate be found insufficient to meet the demands made upon the funds it would of necessity be raised before the next levy, but should it be found in excess, the rates would be lower for the next year. The Sanitary Engineer has reasons to believe that at the close of the first year the commission finds itself with a surplus. Accordingly a lower rate is expected. Statisticians compiling the necessary data expect to finish their work at an early date. The rates for 1916 will then be struck.

While it is impossible at the present time to give any figures as to the new rates, it is certain that the reductions in certain classes will be of substantial amounts, and will be welcomed by the trades effected.

The first year's levy was based on statistics issued by compensation boards in the United States. In most cases the assessments were lower than those across the border and from the one year's business the rates are found still in excess of the demands made upon the commission, despite the fact that thousands of men have been employed in shell [illegible] formerly were engaged in [illegible] work.

Should the second year's existence go to show that still lower rates could be accepted, the levy will, as a matter of course, drop down another notch.

While the commission has been confronted with obstacles placed in its way by some, who on various grounds, objected to its inauguration, it is rapidly overcoming all criticisms and even now has the co-operation of many who at the outset were antagonistic to its inception.

Co-operation of Employer Needed

Co-operation of the employer is perhaps the commission's greatest necessity, for without it the commissioners are greatly handicapped in their endeavor to place the scheme on a smooth operating basis.

The rates are based on the annual pay roll and where an employer over estimates his pay sheet when making his returns to the commission the overcharge may be deducted from the following year's assessment. In cases where the business changes ownership ar ceases to exist a refund for the unexpired term will be made.

Success has marked the first step in placing the compensation board on a proper running basis. In any line of business the first twelve months is always looked upon as the hardest milestone to pass. The Workmen's Compensation Commission is running on a purely business system. Its object is, the officers have stated, not to make money for the Government, but simply to provide for the incapacitated. All surplus moneys are held in trust funds and are placed to reserve capital. They also serve to govern the rates, which will be changed from time to time until an assessment can be reached which will meet the demands made upon the commission but will not provide for excessive reserve funds.

The board has statistics showing that large sums of money have been spent during the past year for safety devices. Efforts are being put forth to avert even trivial accidents, but even with the utmost care and with all the modern devices accidents will occur. The percentage of accidents averted by modern safety methods is, strange to say, very small, showing that the compensation commission is playing a very necessary part in providing for employees disabled while engaged at hazardous work.

Since the inauguration of the act a year ago, hardware businesses have been started in many places and others have changed proprietors. For those who are unacquainted with the workings of the commission a few of the leading points may be of interest:

How Act Works

The act divides employers of labor into two distinct classes. Those coming under the first division are those engaging men in work more or less dangerous, and come under the provision of the act while those in class two employ labor which is not looked upon as hazardous to its list of employes are exempt from provision of the act, but are subject to the payment of damages providing the injured employe is able to prove his claim. The only difference the passing of the act made to those in class two was the removal of the old safeguards which protected the employer from paying damages to injured employes, were removed. Up to the time the act went into force an employer who could prove contributory negligence on the part of the injured employe, could escape payment of damages. The fact that the employe assumed the risk when accepting employment, served as a defence. None of these shields are now applicable to the second class.

The commission endeavored to notify every employer of labor in class one before the act came into force, and since then have had men throughout the Province endeavoring to locate employers who come under this heading, and who have not made a report. If neither circular letter nor representative has reached men who come under this section, it does not in any way relieve them from the obligation imposed upon the class as a whole.

The act is retroactive—in other words the payments date from the inauguration of the act, no matter when the money is received. This is necessary owing to the fact that the commission is obliged to pay compensation to all injured employes from the date the legislation went into effect. In other words the employe is insured whether the employer has paid his dues or not.

NOT A GOOD LOCATION

The temperance lecturer had just left the platform when Sandy McDuff walked up to him and said: Weel, weel I enjoyed yer spiel up to the mark excep on pairt yer ken." "And what was that brother?" "Weel yer ken, yer said 'et you wish all the saloons and whiskey wes at the bottom o the sea and I dinna think that was a christian wish at all. I was thinking o all the folk ut wad get drown.

Practical Course for Sheet Metal Workers

ARTICLE No. 28 OF SERIES

By CHARLES SEIVERS

IN this plate is shown the manner of cutting a mitre pattern for mouldings for the purpose of illustrating same, a section of an eavetrough is shown at A, B, C.

To lay out pattern as shown in Fig. 1, draw plan of trough for moulding as shown by D-E-F-G-H-K joining the two points E and H, thus showing mitre line in plan.

Divide both the curved portions of section into equal number of parts and from each of these points and also from the ends or angle of the straight members, draw lines parallel to A-B extending them downward at 90 degrees until they intersect mitre line E-H on plan. Next draw a line at right angles to D-E as shown at L-M, using this line as a base from which to measure.

Now draw line B-L and from it erect the two lines B-A and L-M. On B-A and L-M, Fig. 1 and 2 which are really stretchout lines for the mitres mark off the spaces on section shown by 15, 14, 13, 12, etc., and draw lines joining corresponding points as shown at 14 to 14, 13 to 13, etc.

With compasses or dividers measure from line L-M on plan on each of the lines drawn from divisions in section and set off on corresponding divisions from L-M at Fig. 2. It must be noted that as points numbered 15 and 14 come on exactly same line, the distance from L-M to E will, of course, be the same for both points and will be so set off by simply allowing the actual distance from L-M at Fig. 2 or as shown in back portion of eavetrough in section A-B, 14 and 15. Now proceed in the same manner with remaining points 13, 12, 10, 11, etc. A line traced through the points obtained will give outline of pattern in this case an inside mitre. If an outside mitre pattern were required it would be necessary to place section in its correct position with reference to plan, that is line A-B at back of section placed on line H-K of plan, when the balance of procedure remains same as already described. Another method more commonly used for square mitres is shown by pattern at Fig. 1. From each of the points on section as 1, 2, 3, 4, etc., draw lines to A-B, as shown. Using the line A-B on section as a base to work from measure to points 13, 12, 10, etc., and set off from line A-B at Fig. 1. As points 15 and 14 are on A, B, of section they are on same points at line A-B of pattern. A line drawn through points thus obtained will give outline of pattern for an outside mitre.

To further explain to our readers what is meant by the terms "inside and outside mitres." To define an outside mitre would be, the mitre of say, an eavetrough which is required to fit into a corner made at a valley of a roof. An outside mitre would be required to carry

(Continued on page 34.)

The accompanying article is No. 28 of a course of practical problems for sheet metal workers prepared, especially for the readers of The Sanitary Engineer, by a practical mechanic who is constantly in touch with new problems which are arising in the sheet metal trades. These articles are a regular feature in The Sanitary Engineer, the only paper published in Canada in the interest of sanitary and heating engineering.

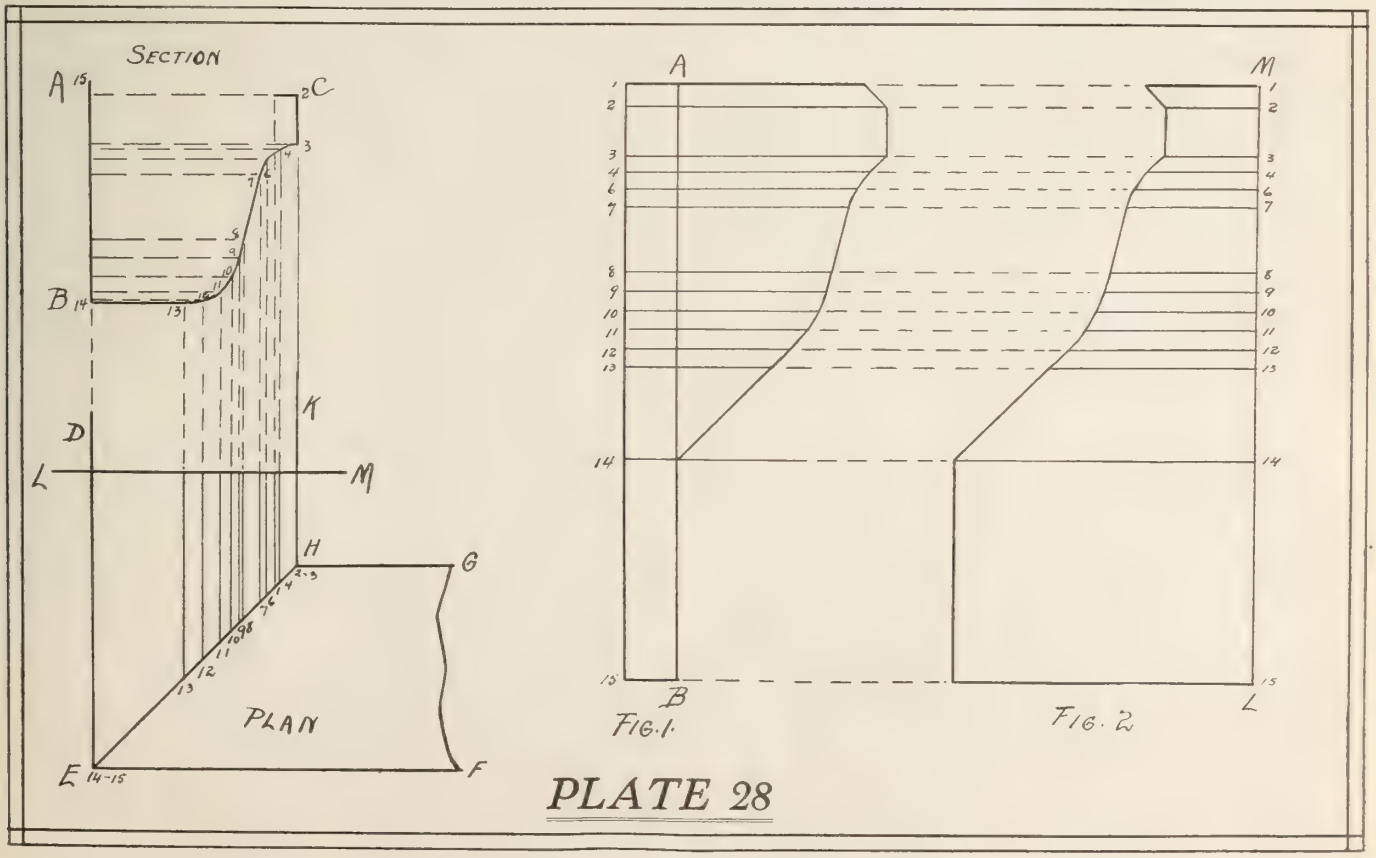


PLATE 28

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FEBRUARY 1, 1916

HEATING REGULATIONS

THIS week we reprint on another page an account of an incident which might have resulted in the loss of five lives.

This "near" tragedy took place in a home where a mother and four children were found almost suffocated with gas fumes from a furnace.

It does not state what kind of a furnace, whether warm air, hot water or steam, but sufficient to say there was an escape of gas from the furnace, which to the practical man means two things poor construction, and loss of fuel—a construction which was not and could not be properly controlled.

THE SANITARY ENGINEER takes credit for standing alone in advocating that all heating and ventilation should be under the control of the local boards of health, and the reasons for taking this stand are numerous.

No one can deny that if a home or other building wherein human beings are spending a good portion of their lives is not properly heated, in a substantial and practical manner, that building cannot lay claim to being sanitary. Any engineering which goes into the make-up of a home, or which is installed for the comfort or in the interest of one's health is of a sanitary nature, and necessary for the maintenance of one's health. Then, granted this is the case, surely such appliances should be under the jurisdiction of the health department.

Has it ever dawned upon the majority of those engaged in the sanitary and heating business, how small a sum in comparison to the total cost of a house, is invested in the sanitary and heating appliances? About ten per cent. is the average and often not more than seven. And look at the wear and tear, the rough usage to which all such appliances are subjected. Take into account the service which such equipment gives to the occupant of the house or building. And then sum up the methods adopted to cut down the cost of such equipment.

Further, the durability of the rest of the structure depends largely upon whether the sanitary and heating appliances are properly installed and of a good quality. In thousands of cases the life of a building could have been prolonged as a whole by years if that building had been properly protected by a good heating system and properly drained.

Sanitary and heating engineers are almost to be envied when one takes into account the good they can do by becoming better salesmen,—men who can show the "whys and wherefores" of better installations.

We should like to hear a few of our readers' views upon this subject. The question is whether it would be better to make heating engineers pass an examination proving their capabilities or to have all heating under the jurisdiction of our health boards. tions.

REDUCTION IN INSURANCE RATES

ON another page there appears an article dealing with the probable reduction in insurance rates for the province of Ontario.

THE SANITARY ENGINEER has from the very start endorsed this new law, and feels pleased to note that the commission is making good.

Many other trades took exception to this compensation Act right from the start. Though for no other reason than simply that of opposing it. Many of those who then opposed the scheme, however, today are endorsing it.

Of course such persons cannot be blamed for viewing the question with some few misgivings because they are more or less imbued with the idea that any government undertaking as a rule means boodle. But when viewed from the standpoint of big business this is not as often the case as one is led to believe.

Another thing—many who criticize the government are men who could not and certainly do not suggest any better way of doing things.

It was with some satisfaction that the Ontario Society of Sanitary and Heating Engineers endorsed the scheme after very carefully going into all the pros and cons: and after one year's actual experience

very few in the trade find it anything to be alarmed about, but rather the reverse. No doubt if those engaged in the trade take every precaution and do all in their power to prevent accidents, if with nothing else in view but periodical reductions in rates, the work of the compensation board and those who compiled it will have proved to be a blessing to all. We hope to see the day when every employee throughout the whole Dominion will be insured in some such a way as those of the province of Ontario.

PROTECT THE FARMER

THE winter time will soon be over and sanitary and heating engineers will, like spring, take on new life. No one, especially a farmer, would ever dream of calling a sanitary engineer into his home in winter to install a system of sanitary fixtures. Of course, there may be a few exceptions.

However, taking this statement for granted, the time is not far off when the farmer will be called upon by many a sanitary engineer and sanitation in the home will be discussed from every known angle.

We would advise a little missionary work being started now, so as to have plans fairly under way with the advent of more congenial weather.

The next thing is to determine to furnish nothing but first-class goods.

The writer has seen in many papers that such and such an installation can be made for certain sums which sum would not provide even a fair quality material alone. We would urge very strongly that the sanitary and heating engineer steer clear of any concern offering to furnish farmers or others residing in rural districts, with certain materials and who are advertising the fact that a home can be furnished with beautifully designed bath rooms, w.c., septic tanks and pneumatic systems, which only require a little common-sense and a pipe wrench to complete the installation. Some there are advertising steel septic tanks, which are installed in the cellars, others are trying to sell pneumatic systems at ridiculously low prices, which will not and do not give good service. From all such "cheap skate schemes" the sanitary and heating engineer should not only steer clear, but should also be on the watch to prevent farmers being deceived.

If a poor installation is made in any district it will tend to spoil the chances for any future business in the same locality while on the other hand, a good system will advertise itself and be the means of pulling future business for the sanitary and heating engineer making the installation.

As THE SANITARY ENGINEER has stated many a time, no goods are too good for the farmer or rural resident. This does not mean to imply that expensive fixtures should be bought but rather the best for lasting service, and the sanitary and heating engineer should make it his business to describe the difference between poor value and good value.

POOR INSTALLATION

IT is a matter for regret to learn that there is a lot of poor work being installed throughout the country by incompetent men, both employers, and those who are not in regular employment, but who own a few tools and are on the lookout for an odd job.

No one can blame the journeyman who finds himself out of a regular job taking anything which may come along which will enable him to earn a few dollars with which to feed and clothe those dependent upon him.

But he should in all fairness, do the work according to the best known practice, and if he is not sure how the job should be done, what is there to prevent him from going to his last employer? or even consulting some authority upon the subject. But to wilfully install or make repairs to existing work in a poor manner cannot help but reflect upon both the person doing the work as well as upon the whole trade.

But, as many have said, "It was ever thus and always will be and what's the use of protesting?"

This is where THE SANITARY ENGINEER and those who make such assertions differ and will do so while there is paper and printers' ink to be had.

THE SANITARY ENGINEER maintains that all such practices in question could be put an end to, if the trade would take a little more interest in the matter, and not be satisfied to say "It was ever thus."

In most towns and cities a license is granted to those engaged in the trade at this time of the year, and those interested in better installations should do all in their power to prevent men from procuring a license, either journeyman or employer when it is known that the applicants are not capable of doing good work.

Again, every department of health ought to insist on an annual inspection of all plumbing.

Many have opposed this idea because of the enormous cost. What about the enormous cost of perpetual repairs?

No self-respecting sanitary and heating engineer hankers after repair work which need not have been required, had the work in the first place been installed properly.

THE SANITARY ENGINEER desires its readers to write us and express their views on this important subject.

A number of questions on this subject are being asked on another page and we will be pleased to discuss these questions from every angle in future issues.

Analysis of Canadian Plumbing By-laws

Proposed New Plumbing By-law for Montreal—Many Clauses Not Only Ridiculous, But Impracticable, Proving That Sanitary Engineers Should be Consulted in Such Matters—The Sanitary Engineer Takes Full Responsibility for the Criticism Published in This Series of Articles.

ARTICLE 10.

WHILE almost every plumbing by-law which has been compiled recently has clauses covering the questions to be taken up in this issue, there are still some by-laws in operation which do not demand these requirements. Not only so, but even in cities and towns where such clauses are in existence, there have been cases brought to the notice of The Sanitary Engineer where the law is not rigidly carried out.

Air Shaft Requirements

Section 717.—Each and every room wherein a bath, water closet, urinal or slop or scullery sink is situated, shall be ventilated by means of a window opening directly to the external atmosphere or by means of an air shaft having an area of at least two square feet. This air shaft shall continue of undiminished size to roof, and at this point its opening shall equal an area not less than that of the shaft.

Without doubt this is a good section. In spirit it means that whether a room in which such fixtures named are situated is on the outside wall of a building or not, there shall be sufficient ventilation provided.

Air Shaft Restrictions

Section 718.—No air shaft or window ventilating either a bath, water closet, urinal, slop or scullery, sink room, shall discharge into or ventilate any other room whatever.

Air Shaft Enlargement

Section 719.—The provision of the last preceding paragraph shall not prevent the enlargement of air shafts to a size suitable and adequate to ventilate a compartment containing a series of closets, urinals, slop or scullery sinks.

Air Exhaust Provision

Section 720.—The requirements of these rules shall not apply to a ventilating system of sufficient capacity to exhaust to above the roof all the air in the compartment or compartments every ten minutes.

All the foregoing sections are very commendable, and fill all the requirements necessary to furnish ventilation for such rooms as are mentioned, providing, of course, that the windows or openings which are either connected to an air shaft or the outside air are opened often.

But there is also another kind of ventilation which does not depend upon open windows, etc., that of local ventilation.

This whole plumbing by-law has ignored vents altogether.

Of course, it must here be admitted that local venting practice is by no means done as well as it should be, and great improvements can be made.

The main idea, however, of local ventilation is to provide some kind of uncontrolled vents or openings which at no time can be closed.

Many men in the trade take the stand that 90 per cent. of the local ventilation at present installed is nothing more than a bill of expense. With such criticism we do not agree. If those opposed to any form of local ventilation will stop up a local vent after having had it in operation for some time they will very soon note the difference.

It might not be out of place, though, to mention that there are many local vents installed which might be made much more effective.

The practice of simply connecting a number of galvanized pipes together irrespective of the size of room, the height or the location of outlets can not be said to be efficient local ventilation. In fact, no local vents can properly ventilate, or do the work that they are intended to do, unless some absolute method of ventilation is adopted. Some proper ventilator top should be fitted to every local ventilation terminal if the compartments are to be ventilated at all seasons of the year and in all degrees of temperature.

Board of Examiners for Plumbers

Section 721.—There shall be a board of examiners for plumbers, consisting of a superintendent, the sanitary engineer, and a master plumber of at least ten years' practical experience, and a plumber of at least ten years' practical experience. The master plumber and the plumber shall be appointed by the Board of Commissioners for a term of two consecutive years, and shall receive a compensation for their service a sum not exceeding ten dollars per day of actual service for the master plumber and five dollars per day of actual service for the plumber.

Section 721 might have been improved if it had read that the sanitary engineer shall be the person acting in the capacity of plumbing inspector. We do know, however, that in the case of Montreal the plumbing inspector is a practical man, and if not on this board of examiners he should be. The public have no idea of the importance of having a qualified and responsible man to occupy the position of plumbing inspector, or there would not be so many men who do not understand the business employed in that capacity, as is the case to-day in many towns and cities.

Duties of Board of Examiners

Section 722.—The Board of Examiners shall appoint a chairman and designate the time and place for the examination of all applicants for a license. The board shall examine each applicant as to his practical and theoretical knowledge of plumbing, house drainage and plumbing ventilation, and shall submit him to some form of practical test as to his competency and ability. If satisfied of the competency of the applicant, the board shall so certify and issue a license either as a master plumber or as a plumber.

License Required by a Plumber

Section 723.—It is forbidden to put up a sign of plumber or to carry on the business of plumbing house drainage and plumbing ventilation by any person other than one possessing a license as a master plumber.

Fee for License

Section 724.—A fee to be paid for license as a master plumber shall be that provided for in the by-law concerning assessments, taxes and licenses.

Register of Plumbers

Section 725.—Every master plumber and every plumber shall register his name and place of business at the office of the department, and he shall

keep the department advised of any change in address.

Official List of Plumbers

Section 726.—An official list of the master plumbers and plumbers recognized by the department shall be posted once a year during the month of May, and certified copies thereof shall be furnished to those who may ask for them. The list shall be posted in the Court House and in the department of the City Hall.

Plumbers to Conform to Regulations

Section 727.—It shall be unlawful to carry on the business of plumbing unless the fee for the license be paid.

Master Plumber's Responsibility

Section 728.—A master plumber shall be held responsible for all the acts of his agent or employees while engaged in plumbing work. Any master plumber or plumber who neglects or refuses to comply with the provision of this by-law may have his license suspended or cancelled by the department, in which case he shall be debarred from obtaining a permit to do any work during the time of cancellation or suspension.

Plumbing Work Forbidden Except by Plumber

Section 729.—It is forbidden for any person other than a master plumber or a plumber to do work of plumbing, house drainage and plumbing ventilation.

Firms May be Master Plumbers

Section 730.—For the purpose of this by-law if a member of a firm has obtained a license as a master plumber the firm shall be qualified as a master plumber.

Corporations May be Master Plumbers

Section 731.—For the purpose of this by-law, if an employee of a corporation in responsibility as manager or superintendent has obtained a license as a master plumber, the corporation shall be a qualified master plumber.

In concluding the comments upon this by-law, it will not be out of place to mention that since the first articles appeared in The Sanitary Engineer there has been appointed a committee to remodel this by-law. This committee, we have been assured, are all practical men, and at some early date we hope to publish the new by-law which cannot be other than a great improvement upon that we have commented upon.

The last few sections reproduced above are about as clear as could be desired, and when the new by-law is brought into force we have no fear but that Montreal citizens as a whole will be better served by the plumbing trade, providing, of course, that the law is always enforced.

(Concluded.)

PRACTICAL SANITARY SCIENCE

(Continued from page 17.)

water there may be from various causes large amounts of ammonia.

Nitrites and Nitrates

From "Modern Methods of Water Purification": —

There is one probable and several possible sources of the presence of nitrites in natural waters. Sewage in its natural state, and sewage partly and imperfectly treated or acted on by agencies which naturally purify it, contain nitrites. The occurrence of nitrites, therefore, at once suggests recent pollution attended with serious danger. Very small amounts, constituting only what chemists call "a trace" have therefore a special significance to the analyst." The presence of nitrites is generally regarded by analysts with grave suspicion as its presence is probably the most significant of any of the matters encountered in a chemical analysis. On the other hand, for various reasons some polluted waters contain no nitrites.

The nitrate is the final form which the nitrogen assumes. It points rather to past pollution but does not necessarily mean that the water is yet safe to drink.

In pure waters, whether surface or ground, nitrites are seldom found. A trace is suspicious and an amount of over, say 0.003 parts might be considered as a good proof of sewage pollution. The amount of nitrates in a pure water varies and may be as high as say 10 parts in a deep well. It is generally not more than one part, however. In the analysis given 0.055 is a fair figure for a river water.

There are other chemical tests made that are important but probably none so significant as those just explained.

Continued in next issue.

WHO AM I?
No. 2

I am the beginning of everything. By me all wealth is made. No man ever succeeded unless I played the greatest part in his life I am the parent of every progressive measure or machine. I can do more to make life worth living than all the wealth in the world. I kill more ills and few can make good in this world without me.

I must be loved before I can be of any use to any person, and, loved I make life sweet, yea, the essence of sweetness.

Wise men find in me their greatest friend though fools abhor me.

I am the parent of democracy, the man who is not a friend of mine is indeed friendless. All power is mine and wealth cannot buy me. I caused Stevenson to invent the first locomotive, Marconi the first wireless apparatus and Mergenthaler, the linotype machine. You cannot name anything of any size that I have not been the most instrumental in bringing into being.

I have made shoeblacks into millionaires. Lincoln knew me, Benjamin Franklin and I were most intimate.

I have only one brother and between us we can do anything. We can build up nations if used together. Germany separated me from my brother and has fallen short and many business men have done the same with the same results. We cannot be separated if lasting success is to be perpetual. We are making new friends every day and those who lose our friendship may just as well be buried. They are dead indeed. We still yearn for more friends and the more we know the greater strides progress will make. No friends of ours are ever in want.

My brother's name is **Honesty** and mine is **Work**.

A HARD PROBLEM

A school teacher once received a note like this: "Dear Mum: Please ixcuse Johnny to-day. He will not be at school. He is acting as timekeeper for his father. Last night you gave him this iximple, If a field is 4 miles square how long will it take a man walking 3 miles an hour to walk 2½ times around it? Johnny ain't no man so we had to send his daddy. They left early this morning and my husband said they ought to be back late to-night, though it would be hard going. Dear mum, please make the nixt problem about ladies, as my husband can't afford to lose the day's work. Goodness knows I don't have no time to loaf, but I can spare a day off occasionally better than my husband can. Resp'y yrs, Mrs. Jones."

WHAT OTHERS SAY OF PRICE-CUTTING

There isn't a crime covered by the moral code that nowadays has not been explained away as being some form or other of disease—dipsomania, kleptomania, and so on, says a writer in "System." And I'm told that price-cutting is also a form of mania. But I don't have much patience with that sort of whitewashing; price-cutting is just pure laziness.

The salesman who does it is too indolent to exert himself to real work—and selling goods is that. So after a few half-hearted efforts he lays down and disgraces himself by slashing prices that is already pared down to the quick.—American Artisan.

Getting After New Business

Sanitary and Heating Engineers in Large Towns and Cities are "Seeking" and "Finding" Business—Becoming Better Salesmen Every Day—Quite a Large Number are Realizing an Improvement in Their Business.

Eighth Article of This Series.

IT is very doubtful if there is another class of business men that is getting as much real co-operation with a view of creating new business as the sanitary and heating engineer.

Manufacturers are spending thousands of dollars on advertising both in trade papers, daily papers and farm papers. It is quite a common thing to see a full-page article in the daily or weekly newspaper describing sanitary and heating installations for the farm.

Farm papers are full of articles, showing and describing in simple words how it is possible for the rural resident to equip his or her home with all the conveniences to be enjoyed in the home of the city dweller. Such being the case, the sanitary and heating engineer should strain every nerve to link up his salesmanship, if he has any, and take advantage of this most popular campaign.

It is a well known fact that the farmer is the better off financially than any other class at the present time, and he has never until very recently been looked upon seriously as a good business proposition for our trade. **The Sanitary Engineer** took up the cry over two years ago, and many there are who heard it and have followed the many suggestions made from time to time in these pages.

This assertion can easily be proved by the fact that there are dozens of lines on the market suitable for farmers and rural residents that were seldom, if ever, heard of.

The question of humidity has been given a lot of prominence in **The Sanitary Engineer**, and this alone opens up a splendid avenue of business, not only in the country, but the city, too.

In the case of the country home, humidifiers should not be left out when estimates are given. There is nothing like starting out right, and it is just as easy to explain the need of humidifiers in the first place as to leave it out and call it an extra.

Just imagine, a person has always been accustomed to have his or her home heated up to 70 degrees, but by installing appliances to furnish sufficient moisture in the rooms, it is quite possible to lower the temperature to 65 degrees. Just figure this out. Suppose the average temperature is 40, then at 70, there must be 30 degrees of heat furnished.

An ordinary furnace to-day is doing fairly well if it is giving off 70 per cent. of the heat units of fuel burned.

By furnishing air moisteners there can be a saving of one-sixth on temperature, which means that if all the heat units were given off in radiation, etc., there would be a saving of one-sixth in the coal consumption. But under fair conditions, there is 30 per cent. lost. Then, again, it is an undisputed fact that the greatest number of cases of tuberculosis are really the direct result of poorly-heated houses, lack of proper ventilation, and dryness of the air.

There is quite a field for the sale of air moisteners at the present day, and if we could only prevail upon our boards of health to take over the supervision of heating of our homes, the time would not be far distant when tuberculosis and all pulmonary diseases would soon be on the decrease.

These are all good talking points, and if properly handled would not only bring new business to the sanitary and heating engineer, but would result in stamping out the most dreaded diseases known to humanity.

HOW TO CATCH A WINTER COLD.

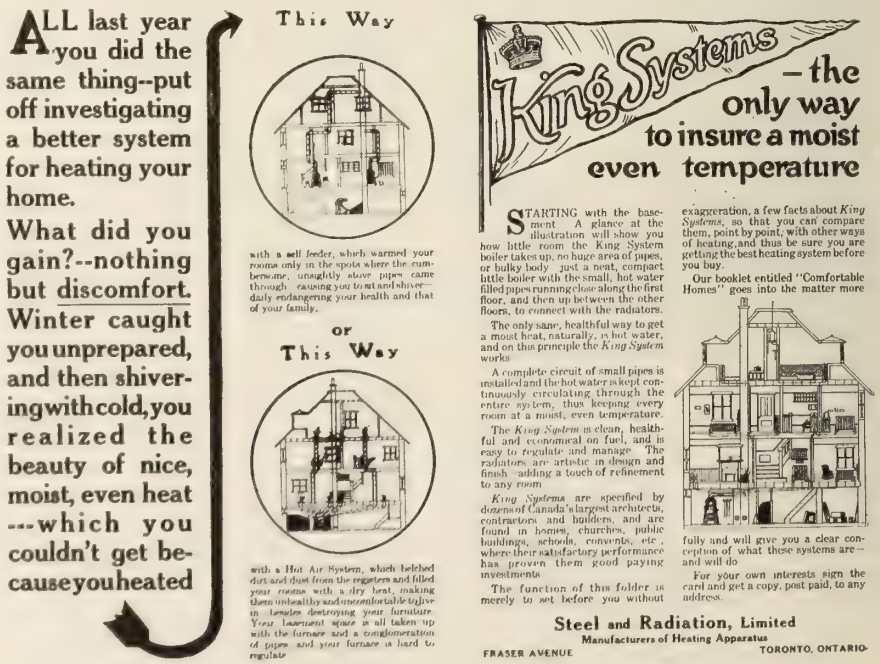
There are several methods of getting a cold. The old original method was to put on your heavy ones during the equinox and then go back to your beeveedees during the Indian summer, and get caught late at night in a heavy frost.

By running to catch your train, riding in a close smoker, sitting in a warm office, eating a hearty lunch and then standing around a couple of hours on a windy street corner watching the war bulletins, you can contract a corker—one that may even develop into something permanent.

Wear a silk muffler, heavy gloves, a thick coat and a hot hat until you get your neck and lungs extremely tender. Then a door ajar or a window open, a crack, or a breath of fresh air will give a cold within ten minutes.

Go out to a banquet, drink everything in sight, eat through the menu, then stand on the corner and talk for two hours explaining to your friends why the generals in the European war do not know how to direct the fighting.

Remove your coat and vest and collar, turn the neckband of your shirt away down, and saunter out on the avenue, looking in all the shop windows, a la friend wife. You will then catch one of those galloping colds which will mark the shortest distance between the first sneeze and your friends' "Doesn't he look natural" bromide.


ALL last year you did the same thing--put off investigating a better system for heating your home.
What did you gain?--nothing but discomfort. Winter caught you unprepared, and then shivering with cold, you realized the beauty of nice, moist, even heat ---which you couldn't get because you heated
This Way
with a self feeder, which warmed your rooms only in the spots where the cumbersome, unsightly stove pipes came through causing you to sit and shiver—daily endangering your health and that of your family.
or
This Way
with a Hot Air System, which belched dirt and dust from the registers and filled your rooms with a dry heat, making them unhealthy and uncomfortable to live in, besides destroying your furniture. Your basement space is all taken up with the furnace and a conglomeration of pipes and your furnace is hard to regulate
King Systems – the only way to insure a moist even temperature
STARTING with the basement. A glance at the illustration will show you how little room the King System boiler takes up, no huge area of pipes, or bulky body just a neat, compact little boiler with the small, hot water filled pipes running close along the first floor, and then up between the other floors, to connect with the radiators.
The only sane, healthful way to get a moist heat, naturally, is hot water, and on this principle the *King System* works.
A complete circuit of small pipes is installed and the hot water is kept continuously circulating through the entire system, thus keeping every room at a moist, even temperature.
The *King System* is clean, healthful and economical on fuel, and is easy to regulate and manage. The radiators are artistic in design and finish adding a touch of refinement to any room.
King Systems are specified by dozens of Canada's largest architects, contractors and builders, and are found in homes, churches, public buildings, schools, convents, etc., where their satisfactory performance has proven them good paying investments.
The function of this folder is merely to set before you without exaggeration, a few facts about *King Systems*, so that you can compare them, point by point, with other ways of heating, and thus be sure you are getting the best heating system before you buy.
Our booklet entitled "Comfortable Homes" goes into the matter more
fully and will give you a clear conception of what these systems are—and will do
For your own interests sign the card and get a copy, post paid, to any address.
Steel and Radiation, Limited
Manufacturers of Heating Apparatus
FRASER AVENUE TORONTO, ONTARIO.

Facsimile of folder recently issued to farmers and rural residents.

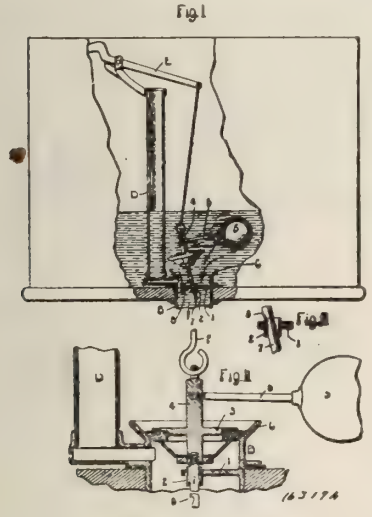
New Canadian Patents

No. 163,174. Flushing Mechanism.

Laura Gilmore, Wellston, assignee of Samuel John Stevens, St. Louis, both of Missouri, U.S.A., 15th June, 1915; 6 years. Filed 19th February, 1915. Receipt No. 248,227.

Claim.—1. The combination with the valve seat of a flush tank outlet, of a support below said valve seat, a tiltable valve movable to and from said valve seat, a stem carried by said valve adapted to engage said support to hold the valve away from said seat when the valve is tilted, and a float by which said valve is tilted to place said stem in engagement with said support.

2. The combination with the valve seat of a flush tank outlet, of a support below said valve seat, a tiltable valve movable to and from said valve seat, a stem carried by said valve slidably fitted to said support and having a detent for engagement with said support, and a float for tilting said valve to cause the detent of said stem to engage said support when the valve is elevated from said seat.



3. The combination with the valve seat of a flush tank outlet, of a support adjacent said valve seat, a tiltable valve movable to and from said valve seat, a detent stem carried by said valve, and a float rigidly secured to said valve adapted to tilt it to place said detent in engagement with said support when the valve is elevated from said valve seat, said float being located at one side of the axis of the valve, for the purpose set forth.

4. The combination with the valve seat of a flush tank outlet, of a support adjacent to said valve seat, a bushing removably mounted in said support, a tiltable valve having a detent stem operable in said bushing adapted to engage the bushing to hold the valve away from its seat when elevated and tilted, and a float carried by said valve by which the valve is tilted when elevated from said seat.

5. The combination with the valve seat of a flush tank outlet, of a support adjacent to said valve seat, a bushing adjustable in said support, a tiltable valve having a detent stem operable in said bushing adapted to engage the bushing to hold the valve away from its seat when elevated and tilted, and a float carried by said valve by which the valve is tilted when elevated from its seat.

6. The combination with the valve seat of a flush tank outlet, of a valve movable toward and away from said seat, a float located at one side of the axis of the valve and rigidly secured to said valve so as to tilt the latter when it rises from its seat, and a detent for holding the valve when it is tilted.

7. The combination with the valve seat of a flush tank outlet, of a valve movable toward and away from said seat, an upper float stem and a lower detent stem, both of said stems being rigidly secured to said valve, a float rod rigidly secured to said upper float stem and extending therefrom at an angle to the axis of the valve, a float secured to said float rod so as to tilt the valve when the latter rises from its seat, and a support below the valve adapted to engage said detent stem so as to support said valve and float when the valve occupies its tilted position.

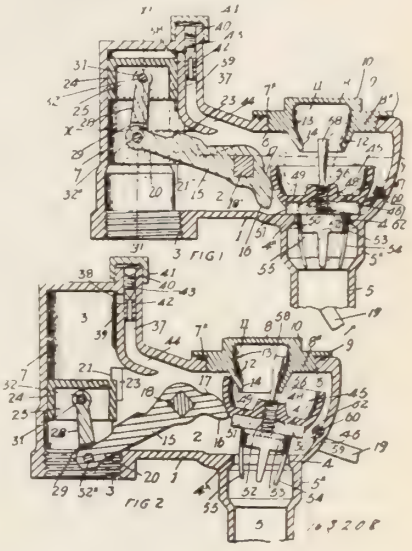
8. The combination with the valve seat of a flush tank outlet, of a valve movable toward and away from said valve seat, a stem extending from said valve, a float rigidly secured to said valve, the said float being located at one side of the axis of the valve, and the said stem being provided with a detent shoulder at the opposite side of the axis of said valve, and a support, the float being operable to tilt the valve so as to engage said detent shoulder with said support when the latter moves from its seat.

No. 163,208. Flushometer.

William Alexander Fraser, Toronto, Ontario, Canada, 15th June, 1915; 6 years. Filed 15th January, 1915. Receipt No. 247,011.

Claim.—1. In a flushometer, the combination with the flushometer casing having the usual inlet and outlet having a flat valve seat extending around the outlet, and an operating lever fulcrumed within the casing, of a valve comprising a segmental spherical body portion against one side of which the operating end of the lever bears and provided with a flat face contacting with the valve seat, a projecting portion carried by the casing against which the opposite side of the valve is tilted, and a depending member extending from the valve through the outlet orifice and of less diameter than the outlet orifice.

2. In a flushometer, the combination with the flushometer casing having the usual inlet and outlet having a flat valve seat extending around the outlet, and an operating lever fulcrumed within the casing, of a valve comprising a segmental



spherical body portion against one side of which the operating end of the lever bears and provided with a flat face contacting with the valve seat, and a projecting portion carried by the casing against which the opposite side of the valve is tilted, a stem extending upwardly from the centre of the valve body, and a bearing flange depending from the top of the flushometer casing against which the stem is carried by the movement of the operating lever.

3. In a device of the class described, a valve comprising a segmental spherical body portion having a flat seating face.

4. In a flushometer, the combination with the flushometer casing having suitable inlet and outlet orifices, and the operating lever fulcrumed with the casing, of a valve comprising a segmental spherical body having a flat seating face, a depending portion extending downwardly from the valve through the out-

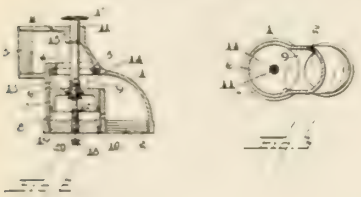
let orifice and of slightly less diameter than the outlet orifice, a stem extending centrally upwardly from the valve body, and a bearing flange depending from the top of the valve casing and against which the stem is carried by the operation of the lever.

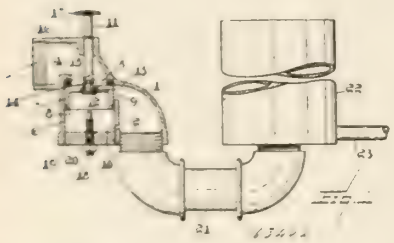
5. In a flushometer, the combination with the flushometer casing having suitable inlet and outlet orifices and the operating lever fulcrumed within the casing, of a valve comprising a segmental spherical body portion having a flat face, a rubber disc forming the seating face of the valve secured against such flat face, and a metallic depending portion secured to the valve body and extending through the outlet orifice free of the sides thereof.

No. 163,402. Flush Valve.

Stafford W. Menzies, Sarnia, Ontario, Canada, 22nd June, 1915; 6 years. Filed 2nd March, 1915. Receipt No. 248,655.

Claim.—1. A valve having an inlet passage and an outlet passage in communi-





cation, a valve seat formed around said communication at the inlet side, a cylinder formed in alignment with said seat, a port of restricted area formed at the side of the cylinder close to the valve seat forming a communication with the inlet passage, a trunk piston valve movable in said cylinder and adapted to seat on said valve seat, a small hole of considerably less area than said restricted port being formed in the side of said cylinder and communicating with the inlet passage, a release valve located in the head of the piston, a valve stem for operating the release valve connected therewith and extending through the casing to the outside thereof, and a spring engaging the piston valve head and the release valve stem tending to close the

2. A valve having an inlet passage and an outlet passage in communication, a valve seat formed around said communication at the inlet side, a cylinder formed in alignment with said seat, a port of restricted area formed at the side of the cylinder close to the valve seat forming a communication with the inlet passage, a trunnion valve movable in said cylinder and adapted to seat on said valve seat, a small hole of considerably less area than the said restricted port being formed in the side of said cylinder and communicating with the inlet passage, a release valve located in the head of the piston, a valve stem for operating the release valve connected therewith and extending through the casing to the outside thereof, a spring engaging the piston head and the release valve stem tending to close the release valve, a screw plug forming the end of the cylinder, and a threaded stem screwed through said plug and adapted to form a stop to limit the downward movement of the release valve and stem.

3. A valve having an inlet passage and an outlet passage in communication, a valve seat formed around said communication at the inlet side, a cylinder formed in alignment with said seat, a port of restricted area formed at the side of the cylinder close to the valve seat forming a communication with the inlet passage, a trunk piston valve movable in said cylinder and adapted to seat on said valve seat a small hole of considerably less area than said restricted port being formed in the side of said cylinder and communicating with the inlet passage, a release valve located in the head of the piston comprising a valve disc, a valve stem passing through an opening in said piston head and extending through the casing to the outside, the disc being adapted to close said opening from below and the stem grooved to permit of the passage of water when the disc is unseated, and a spring engaging the piston valve head and the release valve stem tending to close the release valve.

4. A valve having an inlet passage and an outlet passage in communication, a valve seat formed around said communication at the inlet side, a cylinder formed in alignment with said seat, a port of restricted area formed at the side of the cylinder close to the valve seat forming a communication with the inlet passage, a trunk piston valve movable in said cylinder and adapted to seat on said valve seat, a small hole of considerably less area than said restricted port being formed in the side of said cylinder, and communicating with the inlet passage, a release valve located in the head of the piston comprising a valve disc, a valve stem passing through an opening in said piston head and extending through the casing to the outside, the disc being adapted to close said opening from below and the stem grooved to permit of the passage of water when the disc is unseated, a spring engaging the piston valve head and the release valve stem tending to close the release valve, a screw plug forming the end of the cylinder, and a threaded stem screwed through said plug and adapted to form a stop to limit the downward movement of the release valve and stem.

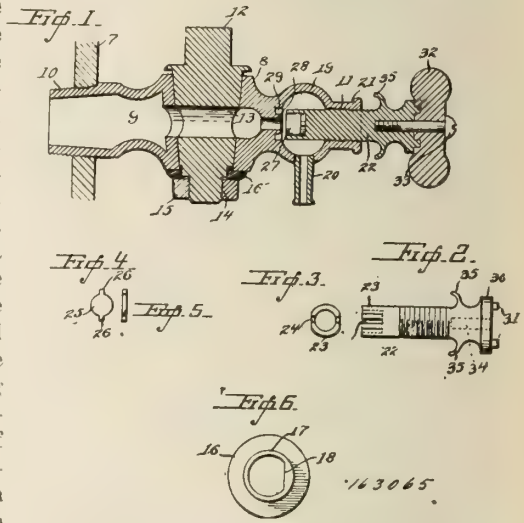
No. 163,065. Gauge Cock.

Robert I. Hogle, Castella, California, U. S. A., 8th June, 1915; 6 years. Filed 21st August, 1914. Receipt No. 242,484.

Claim.—1. A gauge cock including a valve housing, means mounted in said housing for closing communication therethrough at times, and finger lugs carried by said means for facilitating the operation thereof.

2. A gauge cock including a valve housing, means mounted in said housing for closing communication therethrough at times, and means for facilitating the closing of communication through said housing.

3. A gauge cock including a valve housing provided with a valve seat, a

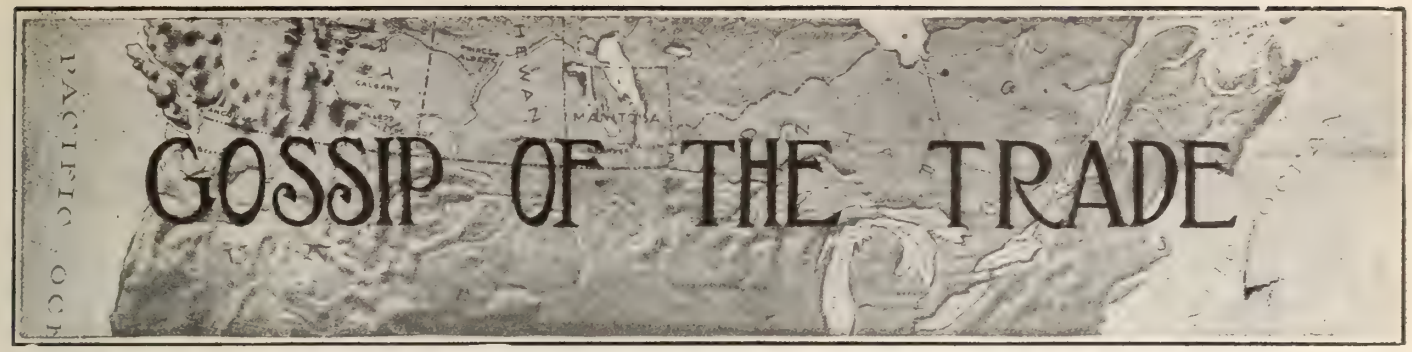


valve adjustably mounted in said housing in axial alignment with said valve seat, a slug mounted in said valve, and means carried by said valve subjacent said slug for facilitating the removal of the latter.

4. A gauge cock including a valve housing provided with a valve seat, a valve mounted in said housing, one end of which is provided with a recess, a slug mounted in said recess for engagement with said valve seat, and a disc mounted in said recess beneath said slug for facilitating the removal of the latter from said recess.

5. A gauge cock including a valve housing having a valve seat, a valve mounted in said housing, one end of which is provided with a recess, a slug mounted in said recess for engagement with said valve seat, and a disc mounted

(Continued on page 34)



STARTED IN BUSINESS

A. Turnau, after a lengthy practical experience, has launched into business for himself as a plumbing and heating contractor at 325 Bleury St. He asks for catalogs and circulars from jobbers and dealers.

WATER HEATER EXPLODED

Mrs. Lloyd Knipfel and child, 46 Scott Street, Berlin, Ont., had a narrow escape from being scalded to death recently when the water heater beside the kitchen range exploded. The stove was upset, and the interior of the kitchen was badly damaged by the blaze which followed, but which was extinguished shortly after the arrival of the firemen. Mrs. Knipfel and her child were not seriously burned.

STEAM PIPE BURSTS: MEN BADLY SCALDED

Two employees of the Hospital for the Insane, named O'Hara and Beckett, had a close call for their lives recently. They were at work in a shallow passage under one of the buildings when a large steam pipe burst, and with such force that a section of pipe weighing about 300 pounds was thrown thirty feet. The live steam escaping into the confined space where the men were threatened their lives. Fortunately at the moment the engineer was in the power house, and had his eyes upon the gauge. He saw it drop, and with presence of mind instantly shut off the steam. This prompt action undoubtedly saved the lives of the men, one of whom had already been severely scalded. They had to crawl for a hundred feet out of the trap in which they had been caught, and were suffering from bad scalds and bruises.

WHY NOT GET BACK TO THE LAND?

"It takes you (and other wage earners in your family, if any) over 41 days to work out your taxes, rates, fees, etc., payable to the city of Toronto, says the Bureau of Municipal Research, in a bulletin issued recently.

The total number of families in the city is 100,000 and the total expenditure $16,757,282. The following table shows how long it takes each family to work out the annual cost of each civic service:

Cost per family in dollars.	City Service.	Cost per family days. Work at $4 per day
$ 37.45	—Debt	9 1-3
33.50	—Schools	8 1-3
14.40	—Fire	3 3-5
10.40	—Deficit	2 3-5
10.10	—Street cleaning	2 1-2
8.90	—Police	2 1-
7.40	—Public works	1 4-5
6.85	—Wat r	1 3-4
5.65	—War tax	1 2-5
5.40	—Hospitals	1 1-3
4.85	—Property dept.	1 1-5
3.80	—Parks	1
3.10	—Health	3-4
2.45	—Civic car lines	3-5
1.95	—Treasury	1-2
1.90	—Charity	1-2
1.70	—Justice	2-5
1.55	—Library	2-5
1.25	—Assessment	1-3
.95	—Architect's dept.	1-4
.90	—City clerk	1-5
.60	—Jail	1-7
.45	—Law	1-9
.15	—Auditor's dept.	1-25
.10	—Distinguished guests	1-40
1.80	—Miscellaneous	2-5
$167.55		41 3-4 days

The above figures show conclusively that The Sanitary Engineer are correct in its contention that big villages are more desirable than large unwieldy cities.

The little town or village which can be easily managed, with its less costly upkeep, and with its fresh air is far more healthy than such cities as Toronto.

And as stated in these pages more than once, the back to the land movement can be stimulated more by sanitary and heating engineers going to the farmer and rural resident, and installing all such conveniences as are found in cities, than by any other craftsman. We cannot urge too strongly that the trade should cater more and more to the rural resident. Many are doing this and are finding business picking up as a result.

Farm papers are urging farmers to install city conveniences, and it only requires the trade to follow up the good work of the farm papers. Several of the daily papers are appropriating page upon page to this same subject, and this cannot fail to bring grist to the mill of The Sanitary, Heating and Ventilating Engineer.

UNITED STATES TRADE WITH NEUTRALS

For the first week of the new year exports from the port of New York amounted to $57,371,000 as compared with $23,272,618 in 1915, and about $18,000,000 in normal years. It would thus appear that New York continues to thrive as the result of the European conflict.

It is interesting to note, however, that the largest increase in the exports from the United States is to the Allies. A decided increase in the exports to Norway and Sweden is noted, but to those countries lying close to the Central Powers, Denmark and the Netherlands, there is a decided decrease. For instance the exports to Denmark for the week ending January 8 amounted to $791,635 as compared with $1,714,033 for the same week of 1915. In the case of the Netherlands the decrease is still more marked from $1,235,477 in 1915 to $191,413 in 1916.

ENAMELWARE FIXTURES.

New Prices Issued Effective Until Further Notice.

3-inch Roll Run.

4 ft.	4½ ft.	5 ft.	5½ ft.	6 ft.
$21.40	$21.40	$21.40	$24.35	$28.75
21.40	21.40	21.40	24.35	.....
21.40	21.40	21.40	24.35	.....

The above prices include crating charge of 75c.

LIST

The List Prices on all other Tubs are increased 5%, except that this increase does not apply on the price of Crates or Boxes.

All other Enamelware, except Laundry Trays and Laundry Tray and Sink Combinations, is advanced 5%.

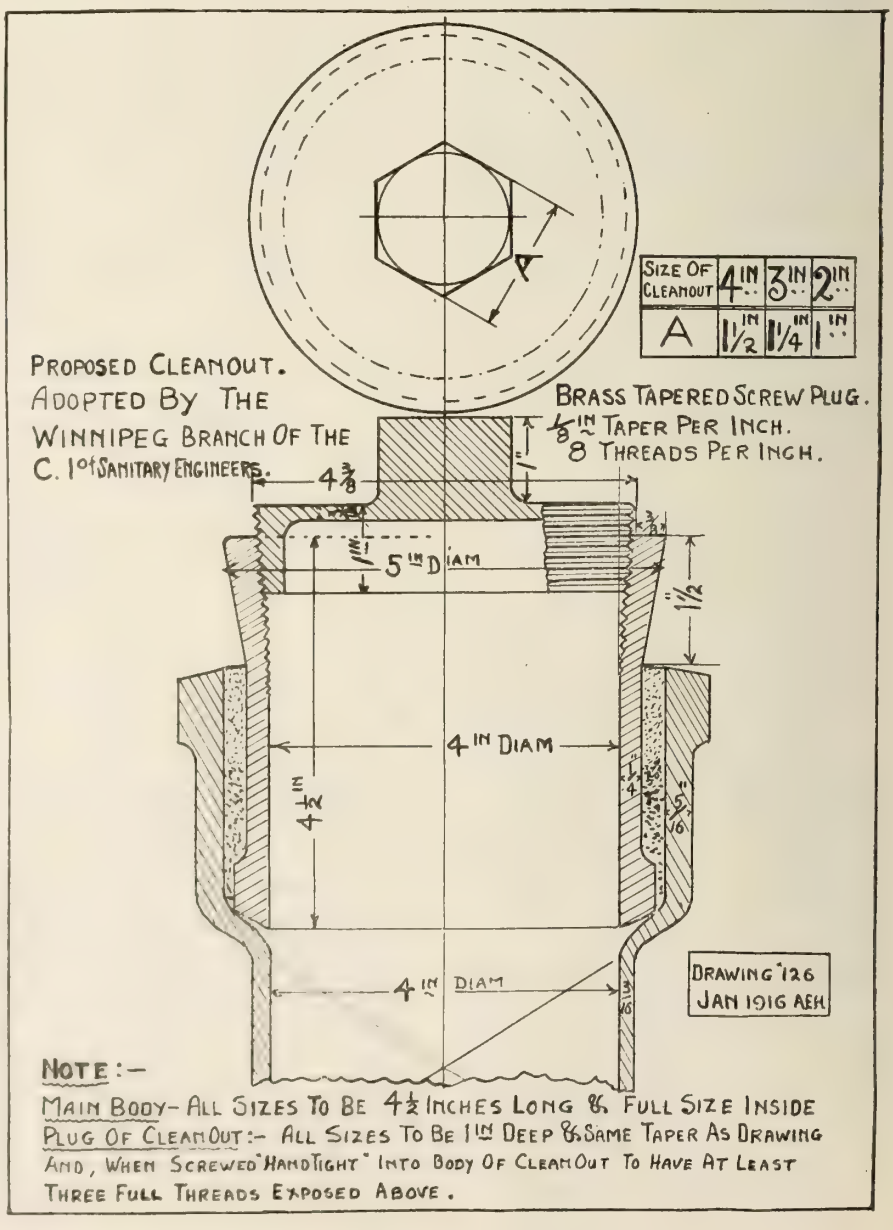
New Clean-out Recommended

Canadian Institute of Sanitary Engineers Holds Meeting and Adopts New Type of Clean-Out. Various Difficulties With Existing Clean-Outs Thoroughly Discussed

A MEETING of the local members of the C. I. S. E. was held on the 14th January at 223 James St., Mr. Wm. Fairley of St. Boniface in the chair. The minutes of the previous meeting having been read and adopted the members proceeded to discuss the question of cleanouts. Plans of cleanouts submitted by different members of the Research Committee were passed round and formed a basis for discussion. Comments were freely made on the cleanouts in use at present showing that the nut on same was too small to allow of getting a proper purchase on it with a situation wrench, the tool most commonly used in removing the cleanout. Another fault found with it was, the part which is hollowed out for receiving the gasket being too deep, as it was pointed out that cotton wick was the material commonly used for this purpose and when the cleanout was turned down the cotton got into the threads which, owing to the thread not being tapered, made it grip and prevented the cover from being removed easily. Three of the designs shown had recessed nuts which it was argued made it fool-proof, as to remove the cover, it would be necessary to use a key for this purpose. It was contended on the other hand that there was nothing could be made in this line which would be fool-proof and that it should be made so that the cover can be removed as easily as possible. Suggestions were made of different styles of nuts and after some discussion it was agreed that the nut be hexagonal in shape and be 1 inch in height above the cover and that it be graded in size according to the size of cleanout, 4 in. cleanouts to have a nut 1½ in. at its smallest diameter, 3 in. cleanouts 1¼ in. and 2 in. cleanouts 1 in.

Regarding the body of the cleanout cover, in the designs submitted there was quite a variety shown, the majority of them using a gasket of some kind for the purpose of making the cover airtight. In the discussion that followed it was contended that, while recognizing the good points of the various cleanouts and the efforts of the designers to have a cleanout which would be satisfactory to all, we should make a departure from the method of having a gasket and have a cover designed on the principle of the ordinary taper plug used in wrought iron work and which seemed to give every satisfaction in steam and hot water installations under varying pressures. It was simple and if properly made should give no trouble in removal, as it was pointed out that the main defect in the taper plugs in use at present in some districts was that the covers were too loose fitting and in making it tight with the wrench, the cover was screwed down under the top of the main body with the result that corrosion started on the top of the threads thereby making it difficult to remove and especially so if cotton wick had been used to make it tight. What was wanted, was to have it perfect fitting and when screwed hand-tight into main body, to have at least 3 full threads remaining above the body for the purpose of tightening the cover. Another point advocated was that the body of the cleanout should have a full-way opening so that the ordinary test plug can be easily slipped past the threaded part and tightened on the plain surface of the cleanout thereby preventing damage to the rubbers on plug.

It was ultimately agreed on the motion of Mr. Wharton seconded by Mr. Samson that a cleanout be adopted having the following details as shown on drawing.



Revival of Business in Quebec Town

The Rock-Bottom of Business in the Dog Days of 1914—Complete Cessation of Business Activity as a Result of War — The Revival of Business on an Unprecedented Scale

WHEN the war broke out Lachine, Quebec, was paralyzed. It is a summer offshoot of Montreal that lived on the spendings of that city's surplus population in the hot months. In the winter things were always quiet unless the Dominion Bridge Company's plant gave employment to a modest number. The summer of 1914 found it very quiet. Its industries are in direct sympathy with those of Montreal, which in common with other manufacturing centres was beginning to feel the griping pains that go with undigested food and rapid expansion in the body economic.

The city dwellers still fluttered about lovely Lake Louise, the islands, and the other nearby beauty spots of the St. Lawrence. But there was a worried expression on the faces of the men folk as they came out by trolley and train nightly. And in the morning they had the look of men who had not slept well. Their women folk seemed content with last year's screens and failed to order lavishly as in previous years the little conveniences for their cottage households, the hammocks, the tinware and enamelware that go with hot weather and happy-go-lucky living. The children sulked and went without new fishing lines, troll spoons and other summer sporting goods.

The industry of the town was dying. The war came and killed it.

The people who had simply done without before now economized and desperately too.

The people who had economized simply left.

But Now for the Second Chapter

Since then things have changed. War orders, shells. An infusion of new blood in the business life of the community, and a mild boom as a result of a new development that has affected all lines of trade.

Those who were economizing are now spending — if not prodigally, at least wisely. Which is much better. Those who were doing without are now having. When the summer residents come, in late years the beginning of all business things, the increase of trade they bring will only cause a ripple. The big trade is already there.

The Dominion Bridge Company is paying out $270,000 each month in this town of less than fifteen thousand people, since the shell industry has arisen Phoenix-like from the ashes of the business despair of 1914. The wages of shell makers are too well known to require enlarging upon. So everyone in Lachine is riding on the new wave of prosperity. Merchants without exception admit an increasing business that approaches old ante-bellum days.

It is generally stated that there is not an empty house in town. A small matter like the size of the rents makes no difference to these affluent aides of Mars. They cannot all be housed in Lachine. The Montreal Tramway Company has added a special service of cars to carry to and fro daily these fifteen hundred high-priced wage earners who reverse the usual order and commute out instead of into their work.

A Small Building Boom

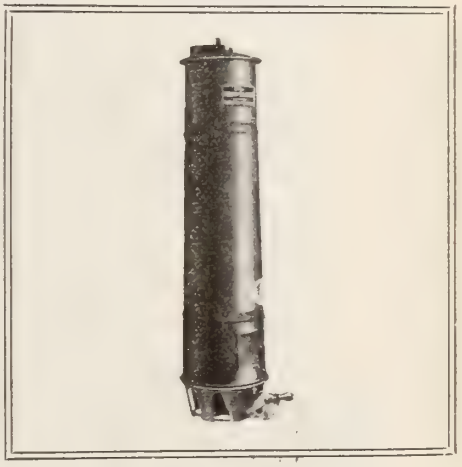
Now most of these fifteen hundred men have families in Montreal. People who experience prosperity for the first time are inclined to want to plan for homes of their own, homes close to their work. Lachine's shellmakers are no exception. The speculative builder and the builder investor have also appeared on the scene, so that that anomaly of the war, a building boomlet appears to be fairly on the way. At any rate considerable building of both a public and a private nature is planned for the spring months. This fact has made the builders' hardware line which the local dealers had come to regard as shelved for an indefinite period, a live issue. It now gives every indication of becoming one of the chief lines in this locality with the advent of spring.

Withal, the growth and improvements has been so gradual and so free from unhealthy tendencies that it impresses the unprejudiced onlooker with its worth. It affords a striking and clear cut example of the metamorphosis that Canadian trade has undergone in the past six months.

New Goods

MOWRY GAS WATER HEATER

No line of domestic heating appliance has received more attention from inventors of recent date than has the gas water heater. And without doubt there have been some very radical changes made in gas water heaters, all with a view to either increase the amount of water heated in a given time, or to cut down the consumption of gas, which, of course, would cut down cost.



The Mowry Gas Water Heater.

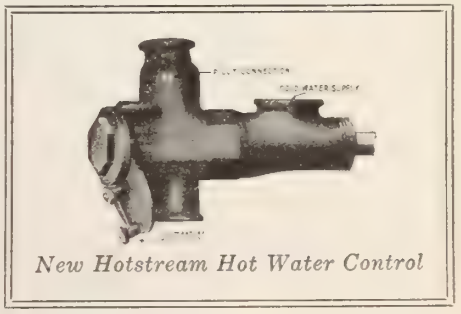
The Mowry gas water heater is claimed to have quite a few novel features about it.

The tubes are vertical, are made of either iron or copper. Plugs are placed in the headers in such a position as to enable each tube being cleaned.

Further particulars may be obtained from the manufacturers, the Mowry Heater Co., 324 Craig Street, West, Montreal.

THE HOTSTREAM BOOK

Above is the title of a very interesting and illustrated book. It is well gotten up, and describes the various lines



New Hotstream Hot Water Control

of Hotstream gas water heaters and specialties in connection with the heating and controlling of gas and water services. These books may be procured from the Hotstream Heater Company, Cleveland, Ohio.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

PIPE TERMINAL QUESTION

Editor The Sanitary Engineer:

Re the proposed plumbing by-law for Montreal to which you refer and the soil pipe terminal, I quite agree with you that 1 inch above the roof is quite sufficient.

For some time now I have on my jobs cut off the pipe to the pitch of roof and covered with sheet lead, as per sketch, Fig. 1. This in my opinion is far ahead, if properly done, of the pipe being 10 or 12 inches above the roof with a galvanized iron roof jack on.

In cutting the pipe to pitch of roof, say, 45 degrees, it increases the opening.

I would like your opinion whether you think this enough, or do you advise still increasing it 2 inches at the roof? I may say that I put in the pipe as per sketch, using the increaser. Do you think the increaser necessary?

G. E. P., Sask., S.

We appreciate the fact that G. E. P. reads our comments in connection with the analysis of Canadian plumbing by-laws.

Regarding the increased question at roof terminals, it is the firm opinion of the writer that all roof terminals should be increased in such localities where trouble is caused by hoar frost, closing the terminals either wholly or partially. In this issue there appears an article dealing with the question of roof terminals, and the one endorsed by the Canadian Institute of Sanitary Engineers has many points in its favor. It will be noted that this roof terminal also acts as an increaser as well as roof terminal.

With reference to the opening being made larger on account of the roof piece being cut at an angle, this is not actually increased by being so cut, because the capacity of the pipe can only be determined by the true diameter. It would not be possible to get any more air or water through any pipe by cutting it at an angle.—Editor.

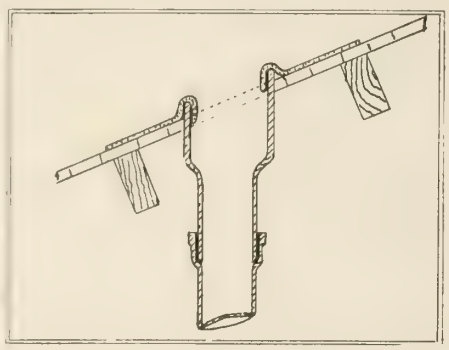


Fig. 1. Sketch submitted by G. E. P., Sask., S.

SOME INTERESTING QUESTIONS

Editor The Sanitary Engineer:

Will you please publish the following questions along with your answers in an early issue of The Sanitary Engineer?

1. What causes the gurgling sound in a basin after the water has left the bowl?

2. How can I remove enamel from a cast iron enamelled bath tub?

3. Is there any way of treating a bath tub with the enamel off? A white finish preferred, but any other color will do.

4. Is it wrong to leave the overflow on a hot water heating system without a vent, so long as the lowest point of the overflow is at the expansion tank?

5. How can I find the circumference of a circle with a pair of compasses and a square?

A Subscriber, Belleville.

1. The gurgling sound in a basin is caused by some influence acting on the water in the trap. The gurgling may be caused by several things happening. By the trap having no vent and the water becoming partially syphoned from the trap; or if the trap is vented, the vent is partially blocked up, if not wholly.

If the vent is not clear, and the waste pipe is long, this long leg will result in a gurgling sound being heard.

This is one of the reasons why the continuous waste and vent pipe is preferable as against the ordinary method of running waste pipe to the floor with either a crown vent or side vent, such as is used in Toronto and other large cities where the crown vent is not allowed.

This gurgling sound may also be caused where the basin is situated in a basement or floor below where larger fixtures, w.c.'s, etc., are situated above, and when this basin is not back vented.

In all cases gurgling at any trapped fixture is a proof that the trap is liable to have its water seal broken.

2. It is not possible to remove the porcelain enamel off cast iron without heating the whole fixture to a very excessive heat, such as placing it in a retort; even then all the enamel would not be thoroughly removed. As far as can be learned it would be a case of melting the fixture; the enamel then would form a sort of slag.

3. There is no reliable way of putting a coating of enamel on a fixture which has been chipped or fractured. At least not porcelain enamel, such as the rest of the fixture is made of.

If the portion chipped is not liable to come in contact with water, then the appearance may be improved by getting a white paint enamel to match the color, thoroughly cleaning the part to be enamelled with muriatic acid, washing acid off, drying with methylated spirits, and then applying the white enamel.

4. Re question of overflow pipe at expansion tank.

This would have been more clear if a sketch had accompanied the question. However, it may be stated that, providing the overflow is taken from the top of

(Continued on page 32.)

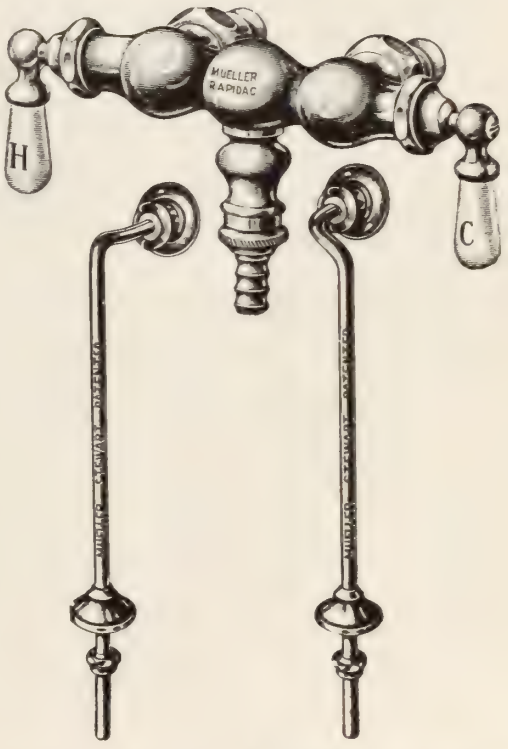
The Goods You'll Eventually Buy Just Examine This Illustration

It is fuller in design, compression in action. Our Rapidac line is made up in several styles and designs.

MUELLER *Rapidac*

QUALITY FIRST

When asking a customer to buy, you always explain the splendid quality, the lasting service, etc., and finally you guarantee the goods. Which means you put quality first.



PRICE SECONDARY

Then you are asked the price, you discuss this subject at length, but Quality always justifies any argument involved. This proves that price is secondary.

NO SUCCESSFUL BUSINESS was ever built up on price only. It is quality that counts. Our goods are big business builders. Let us help to build up your business.

Sold by all jobbers throughout the Dominion.

H. Mueller Manufacturing Company, Limited
SARNIA, ONTARIO

THE QUESTION BOX

(Continued from page 30.)

the expansion tank, and is not of such a length in a downward direction as to create a vacuum of sufficient strength to cause the expansion tank to collapse, it does not matter about there being a vent.

The fact is most expansion tanks are altogether too light; they should be built just as strong as the furnace, for the simple reason that if a vent, which, as a rule, terminates through the roof, becomes frozen up, all the force of water expansion is placed on the tank, and scores are known to burst or collapse either by pressure or vacuum.

After all, the open automatic tank is becoming more generally used every day, and when such a style is used there is no need of a vent, and the overflow pipe is a simple matter.

5. To find the circumference of a circle measure the diameter and multiply it by 3.1415, or approximately 3 1-7. For instance, if the diameter is 8 inches, the circumference will be 25.132, or 25⅛ inches. This is correct to within the hundredth part of an inch, and is near enough for all practical purposes.

PROPER COLD AIR SUPPLY TO WARM AIR FURNACES

Editor Sanitary Engineer.

In visiting many homes and dwellings I have had complaints from several persons that their hot-air furnaces were not giving satisfaction. In spite of the fact that they were burning coal in large quantities and keeping a red-hot fire going continually, their registers were giving but little heat. Upon investigation, I have found the cold air supply much too small in proportion to the amount of hot air required to keep the house warm enough to be comfortable. I would, therefore, be pleased if you would inform me the correct method of measuring a hot-air furnace, and also say what quantity of cold air is required for the average furnace. Many people who do not understand the installation of a warm-air furnace are being imposed upon by furnace companies who take advantage of their ignorance and install furnaces without the proper size of cold air supply. I think the sooner that this matter is taken up by the Board of Health the better it will be for the people's pockets as well as for their lives and health.

"One in Favor of Inspection."

Replying to the above question, re cold air supply to warm air furnaces, this is a subject of very great importance, and is not given the attention it should receive.

Very few warm air furnaces are installed in a scientific manner, and many should not be installed at all.

We will publish at a later date exact details of a regular system, which may be followed with satisfactory results. For the present, however, we may say that as a general rule, without having any size of rooms given, or the heat loss, etc, the following table may be used where the amount of warm air pipe has been determined:

WARM AIR PIPES.

No. of Pipes	Dia. of Pipes.	Area in Sq. Inches	Total area in Sq. Inches
3	9	63.617	196.851
2	10	78.540	157.080
1	12	113.096	113.096
Total sq. inches			967.037

Approximately in round figures, 967 sq. inches.

Allow 25 per cent. less area for cold air pipes, which should be taken from coldest part of house.

Not less than two.
Round 2—18 in. Diam.
Rectangular 2—14 x 20 in.

The above are approximately round figures.

This question comes in at a very opportune time, when considering the remarks of our correspondent. The following newspaper clipping proves the truth of his assertion when he says: "I think the sooner this matter is taken up by the Board of Health the better it will be for the people's pockets as well as for their lives and health."

FROM THE TORONTO DAILY NEWS, JANUARY 25TH

Woman and Family Nearly Asphyxiated

Mrs. Rebecca Frankel and her four children, aged 11, 8, 6 and 3 years, respectively, narrowly escaped being asphyxiated by furnace gas to-day. They were found unconscious in bed at their house at 302 Manning Avenue, at 12.30 p.m., by a neighbor, Mrs. Smith, who became alarmed when none of the family made an appearance. She called a constable, the door was forced open, and entering they found the woman and her children overcome by the fumes.

Fortunately they were not too strongly in the grip of the deadly fumes, and within a few minutes all were revived and were little the worse for their experience. The police ambulance, which had been rushed to the spot to remove them to a hospital, was not needed.

Above is only one of many cases which occur every week in Canada. It will be seen that this might easily have ended in the loss of five lives; and still, in spite of all this, our Boards of Health are looked upon as a bill of expense. Every time a careless spendthrift mayor and council get on the cutting down rampage, they start with the Board of Health. From Vancouver, B.C., to Halifax, N.S., the same cry prevails. These same councillors can waste millions of dollars on fool sewage disposal plants, or unnecessary water works, can keep a closed eye to wastage of water, but once try and save the lives of the people by adopting preventative measures through the energy of an efficient Board of Health and there is trouble. The fact is there is not sufficient graft on it for these councillors.—Editor.

FLARED ARTICLES ROUND TO SQUARE

Editor The Sanitary Engineer.

I am following the course on sheet metal pattern development, and find it very interesting.

There are, however, two patterns which I would like to know how to develop, which if you can describe in your question box at an early date will very much oblige me. The patterns I want information about are for a square to round tapered from the square. The round ends to be the smallest, something like a register box.

Plumber Sheet Metal Worker.

Replying to the above question, Fig. 1 is that of a flared article, square at the bottom and round at top, the top is shown in centre of plan. The elevation A B C D shows a side view, A E being the straight height, thus forming the true altitude of triangles to be formed on plan.

In the plan, A B D E outline one-half the plan, and as it will be observed each of the two sections are the same. Divide the half circle on the line A-E into a number of equal parts, viz. 8, 1 to 9 inclusive. From each division in the different quarter circles draw lines to the corners as shown from 1-2-3-4-5 to B, and 5-6-7-8-9 to D. These lines A-1, B-1, B-2, B-3, etc., form the basis of the triangles and the altitude of the triangles is taken from height of elevation as A-E.

To lay out pattern, draw a line as A-B, equal to A-B, on plan. With compasses take distance A 1 on plan and set off at right angles to altitude A E as shown by X A 1, this being the triangle on the line A 1 on plan. Measure the distance from X to 1, and with A on pattern as a centre, draw an arc; set base-line D 1 on base-line from altitude as shown by X B 1, and with X 1 as a

radius and B on pattern as a centre, draw an arc cutting arc drawn from A, thus obtaining point 1. Next set off B 2 on base line from X B, and with X 2 as a radius and B on pattern as a centre draw an arc, with one of the divisions on half circle, as 1 2 or 2 3, as a radius, and point 1 on pattern as a centre draw an arc intersecting arc just drawn obtaining point 2.

Proceed in same manner with points B 3, B 4, B 5. When the points B 5 are obtained, using B C on plan as a radius and B on pattern as a centre, draw an arc. And with C 5 on plan as a base and C X as height, obtaining X 5 as radius, with point 5 on pattern as a centre and X 5 as a radius draw an arc cutting one just drawn, obtaining point 5 C on pattern. A line drawn through points A B C, 5 4 3 2 1 will outline one-quarter of pattern, which can be used to mark off balance, or the above can be repeated once to give half the pattern as shown.

The article shown in Fig. 2 is a flaring article, square at base, round at top, but with one side vertical. The plan shows the top and bottom in their relative positions, as the two halves are the same, only the one half outlined by A B C D on plan need be developed. The method for doing this is the same as that described for Fig. 1, with the exception that the half pattern in this case must at least be completed. In developing it is always a good point to number and letter the different points to avoid confusion. The student must not forget that no allowance is shown for seams or locks.

EXPANSION TANK AND CIRCULATING PIPE

Editor The Sanitary Engineer:

I have read from time to time in your journal that you prefer to have all range boilers connected to an expansion tank. I believe you are right in this matter, but not having been in business very long, and always being accustomed to connect all the range boiler jobs I've done to the city pressure, I am confronted with another problem which I would like a little information about. Here is the question: I have to install at some future date, a range boiler in a bathroom, the range is situated almost directly below the bath room. I propose to put an expansion tank in an attic above. This will be furnished with water by a pneumatic water system. How can I run a circulating pipe on this job? Your reply in an early issue of The Sanitary Engineer will greatly oblige.

Circulator. Manitoba.

Without doubt all range boilers should be furnished with water supply from an expansion tank. During the last few weeks we have read several newspaper reports of accidents caused by bursting of water fronts, pipes, as well as range boilers. One reader asked us some time ago how it was that range boilers do not appear to last as long as they used to years ago.

This trouble is simply caused in most cases because of the way range boilers are connected up to city pressure services, whereas years ago the expansion tanks were more generally in use.

Fig. 1 shows how one may install the job. It will be seen by our readers that the water is circulating all the time between the highest point at the range boiler and the lowest point on the range boiler connection at the range. This will ensure hot water at a moment's notice. Not only so, but when such an installation is supplied with cold water from a pneumatic system there is a great saving of water as a result. It might be easy to assume that 25 to 30 per cent. of a saving in pumping can be effected by connecting the job in this way.—Editor. See page 34 for cut describing the answer to this question.

NEW CANADIAN PATENTS

(Continued from page 26.)

in said recess beneath said slug having lugs extending therefrom, at diametrically opposite points and extending through the longitudinal extending slots in said valve, for the purpose specified.

6. A gauge cock including a housing, a turning plug mounted in said housing for closing communication therethrough at times, said housing provided with a valve seat, a valve adjustably mounted in said housing in axial alignment in said valve seat, one end of said valve provided with a recess, a slug detachably arranged in said recess for engagement at times with said seat, a handle detachably associated with the opposite end of

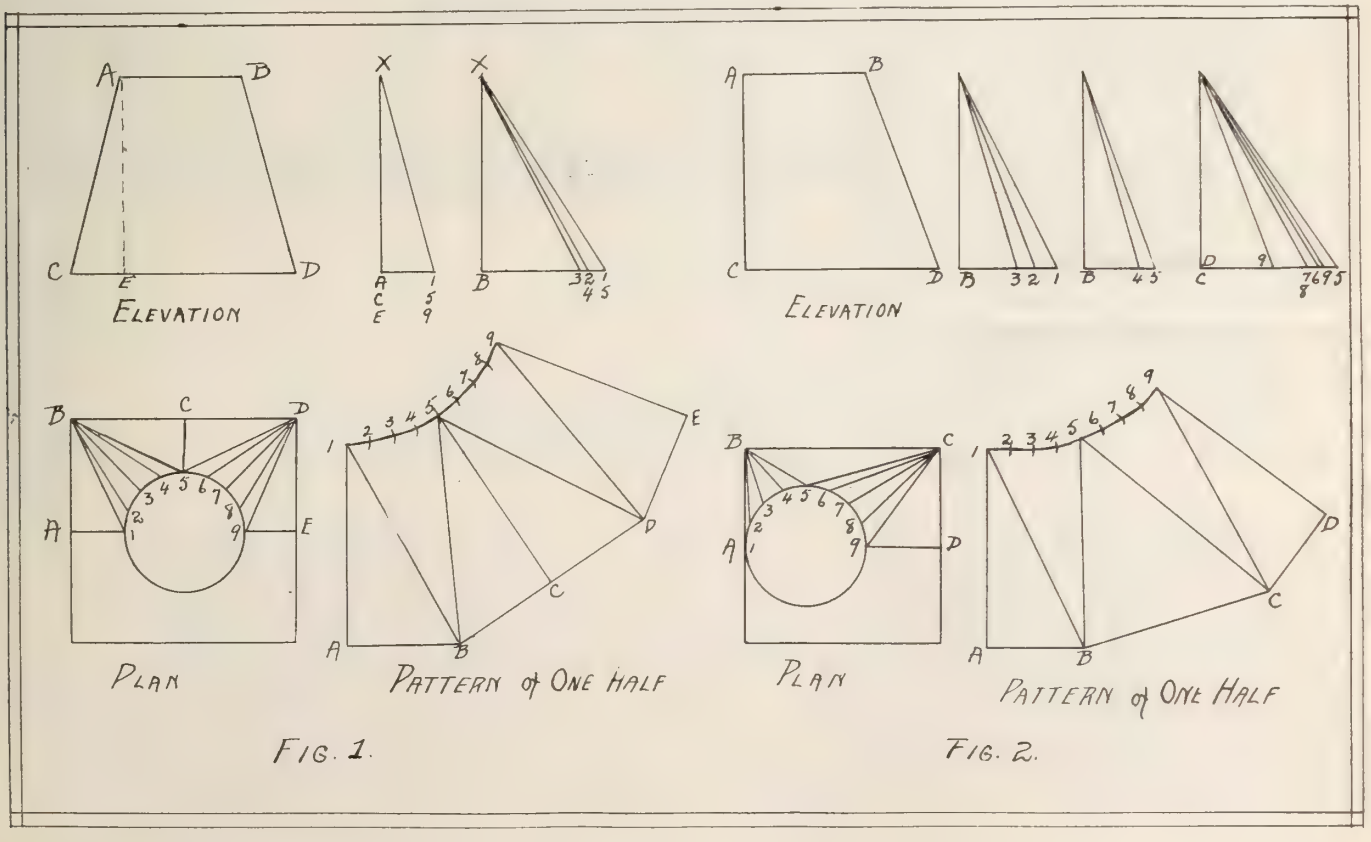


FIG. 1. FIG. 2.

PURO

(MADE IN CANADA)

Good-bye

GERM-LADEN DRINKING CUP

The old-fashioned public drinking cup, with [illegible] possibilities, is rapidly becoming [illegible] as a result of the movement advocating "Safety First" where drinking [illegible] is concerned.

This movement is creating a big demand for some simple, sanitary device to replace the discarded cup in thousands of factories, [illegible] etc.

THERE IS AN UNUSUAL OPPORTUNITY FOR THE LIVE SANITARY ENGINEER TO MATERIALLY INCREASE HIS TURNOVER BY GETTING AFTER THE SCHOOL BOARDS OFFICES FACTORIES ETC IN HIS NEIGHBORHOOD

Bring the merits of the

Puro Sanitary Drinking Fountain

before your prospects. They will readily appreciate its many attractive features, particularly its simple, automatic control. Drop us a card to-day and let us show you the profits within your easy reach.

Puro Sanitary Drinking Fountain Company

147 University Ave., Toronto, Canada

PRACTICAL COURSE OF SHEET METAL WORKERS.

(Continued from page 19

an eavetrough round the base of a roof [illegible].

If there are both inside and outside mitres required, all of which are square, or 90 degrees, they can be procured by careful cutting as shown in Figs. 1 and 2. To make an outside mitre, two pieces of pattern, Fig. 1, would be needed. And to make an inside mitre, it would take two pieces of pattern, Fig. 2. Thus it will be seen that if there is sufficient material left on each pattern the four pieces will make one inside and one out[illegible]

NEW CANADIAN PATENTS

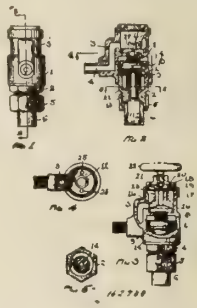
(Continued from page 33)

said valve, and finger lugs formed on said valve for facilitating the actuation of the latter.

No. 162,980. Air Valve for Radiators.

The Bishop-Babcock-Becker Company, assignee of Theodore H. Schutt, both of Cleveland, Ohio, U.S.A., 8th June, 1915; 6 years. Filed 10th June, 1914. Receipt No. 239,917.

Claim.—1. In a radiator valve, the combination of a casing having aligned inlet and outlet openings, a removable cover for said casing aligned with such openings, two inwardly extending and substantially aligned collars mounted in said casing between such openings, a valve seat mounted in one of said collars, a thermostatic valve member mounted in the other of said collars and adapted to engage said seat, and a strainer removably mounted in said casing between such openings and upon the last-named of said collars, said strainer being removal of said cover.



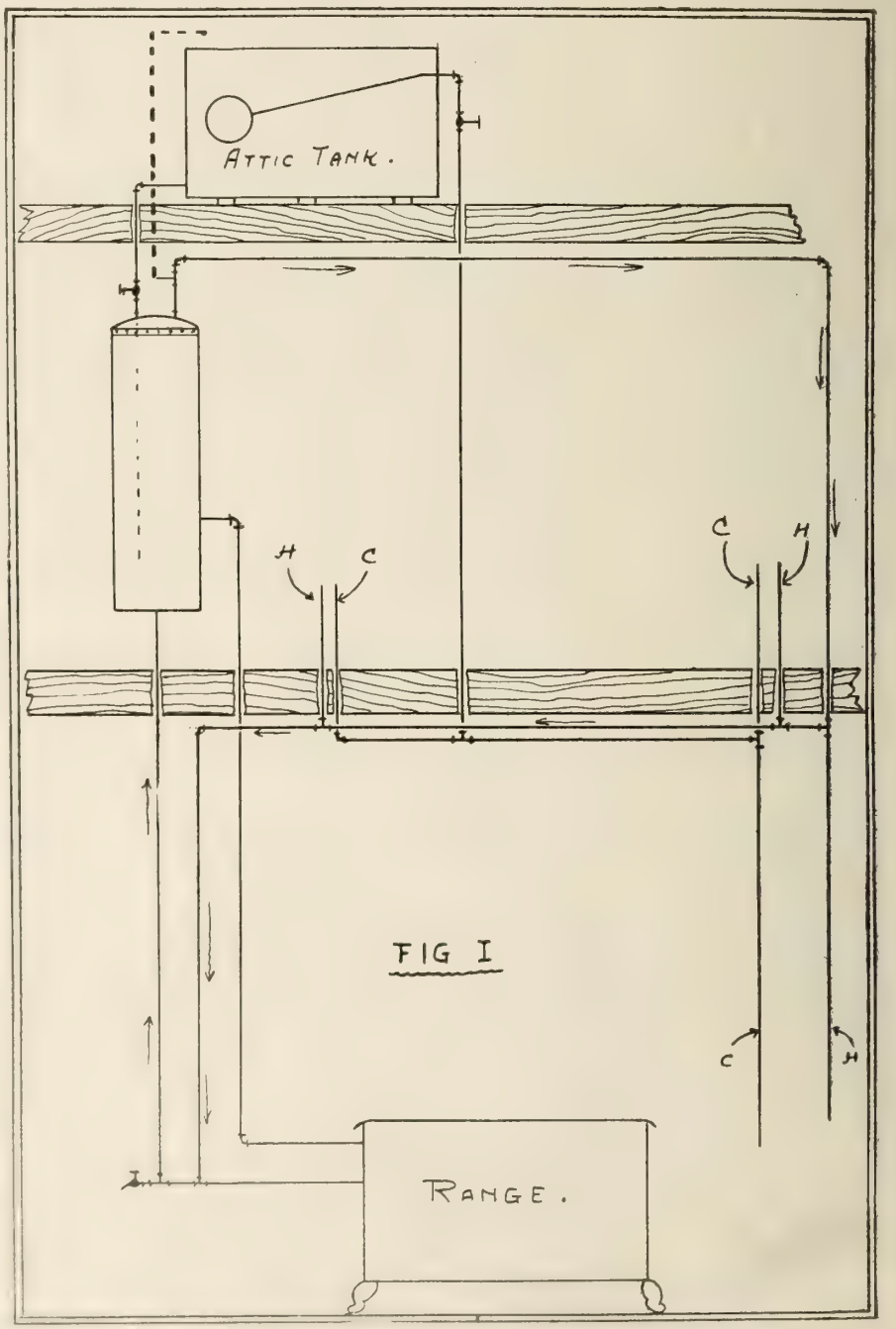


FIG I

Showing how circulating pipe and expansion tank should be connected.

MORRISON'S

—CUSHION—

Compression Work

THE ADVANTAGES OF THE CUSHION DISC CANNOT BE OVERRATED

THE RUBBER CUSHION ENABLES THE VALVE TO CLOSE WITH A MINIMUM COMPRESSION, WHILE THE BRASS WASHER TAKES CARE OF THE ROTARY MOTION, PREVENTING FRICTION BETWEEN THE DISC AND SEAT.

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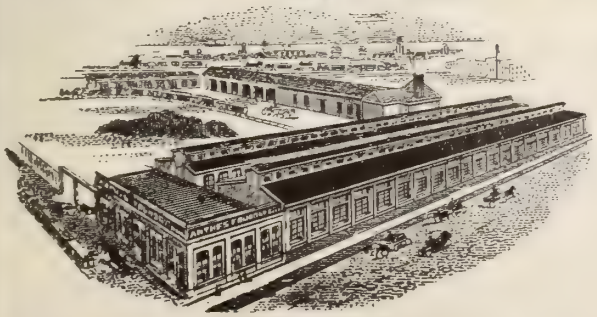

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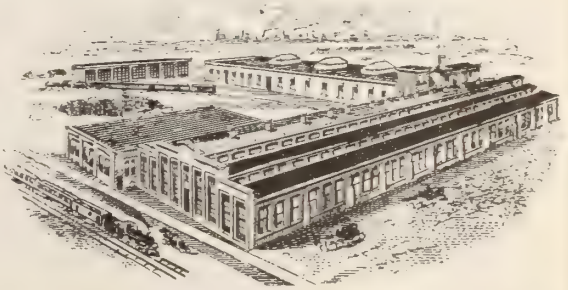

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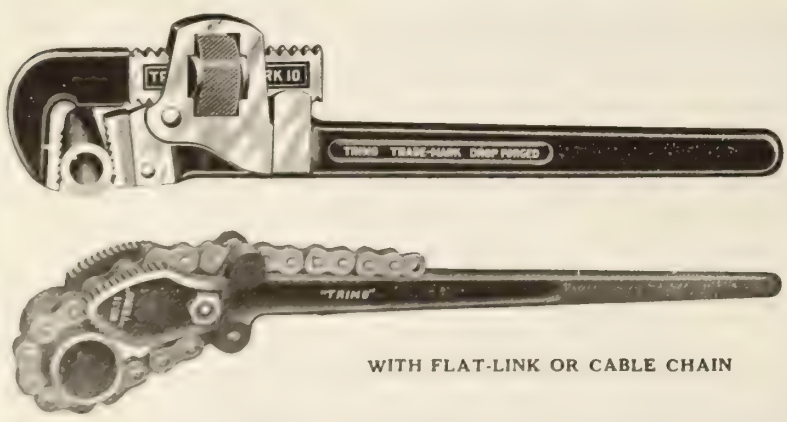

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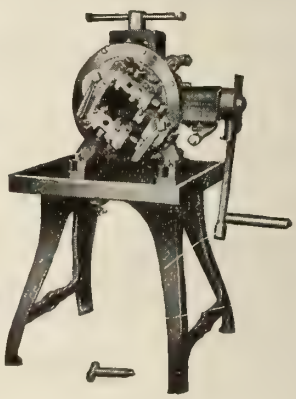

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A time and labor saving machine.

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BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
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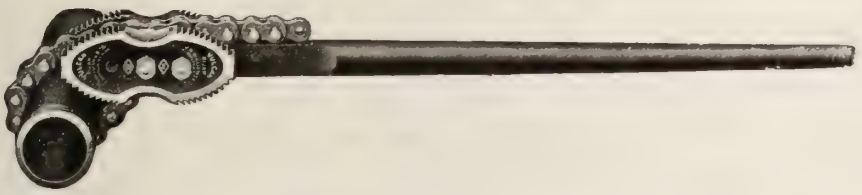

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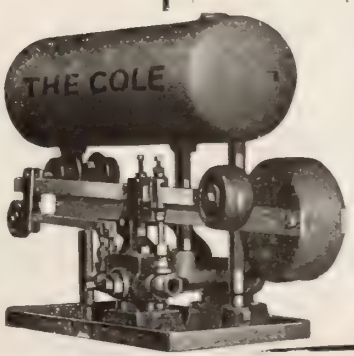

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They work with the utmost in efficiency and reliability, and return condensation at any pressure.

Operate on roller bearings, on a fixed Fulcrum which permits of full discharge at each operation.

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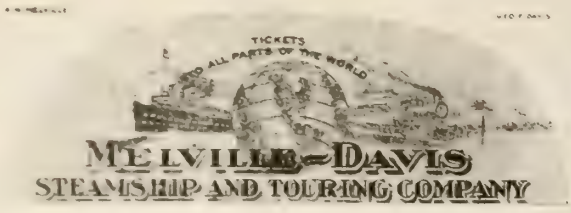

Dec. 4th, 1915.

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T o r o n t o.

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Yours very truly,

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You will want more information, so drop us a line to-day, indicating what line you are interested in.

Ontario Wind Engine & Pump Co.
LIMITED

Toronto, Montreal, Winnipeg, Regina, Calgary

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Read over the letter which we have reproduced here—look at the home of the man who wrote it—then you will have to admit that the reputation of "**TORONTO**" Water Systems is one to be envied by any manufacturer. This is not an isolated case—it is only one among many. We are constantly receiving similar letters of commendation from our satisfied customers.

"Oaklands," Residence of Mr. G. F. Davis.

The Safe Mercury Seal

The Honeywell Heat Generator—the only perfectly safe device for sealing a hot water system. No springs, weights, valves or movable parts—nothing but two open tubes joined at the bottom through which mercury and water circulates.

Dependable

It is absolutely impossible to stick or create more than ten pounds pressure in the Honeywell Generator. It gives perfect satisfaction under all conditions, and can be used for either old or new work.

Write for Booklet "How to Properly Design and Install the Honeywell Method of Hot Water Heating." It is free.

HONEYWELL HEATING SPECIALTY CO.
Wabash, Indiana

Manufacturers of High-Grade Heating Specialties

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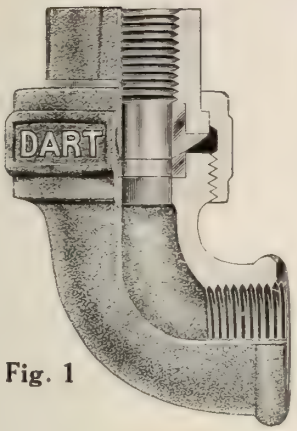

Fig. 1

By the use of Figure 1 you save two threads, do neater work and make sure that the connection is trouble-proof.

DART

Union Elbows—Female, and Male and Female

Save time and labor

2 - BRONZE SEATS - 2

NO CORROSION

Heavy Malleable Iron Pipe ends and nuts ensure strength and durability. **Dart Unions stay tight**—they never require readjustment.

Nearly twenty years of successful record is your guarantee of the Dart construction.

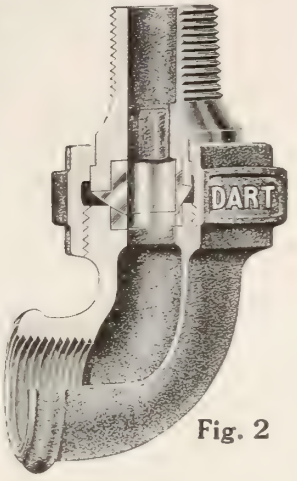

Fig. 2

Figure 2 is a 4-in-1 fitting. It cuts out nipple and one thread at running end and nipple, elbow and two threads at the elbow end.

Sold by all jobbers.

Manufactured by DART UNION COMPANY, LTD., Toronto, Canada

Kerr Radiator Valves and Union Elbows

for Steam and Hot Water Heating Systems, possess the proper staying qualities. They are not only up to the minute in appearance, but are there with the quality under the polish and nickel.

Works at Walkerville, Ontario

If you have been in the Heating business any length of time, you should be familiar with KERR valves.

If you are new at the game, we invite you to "get wise" to this line of valves. Our catalogue No. 5, is yours for the asking.

You don't experiment when you buy Kerr valves.

We paid for the experiments long ago.

The Kerr Engine Company

LIMITED

WALKERVILLE - - ONTARIO

TRADE-MARK
"PERFECTO"
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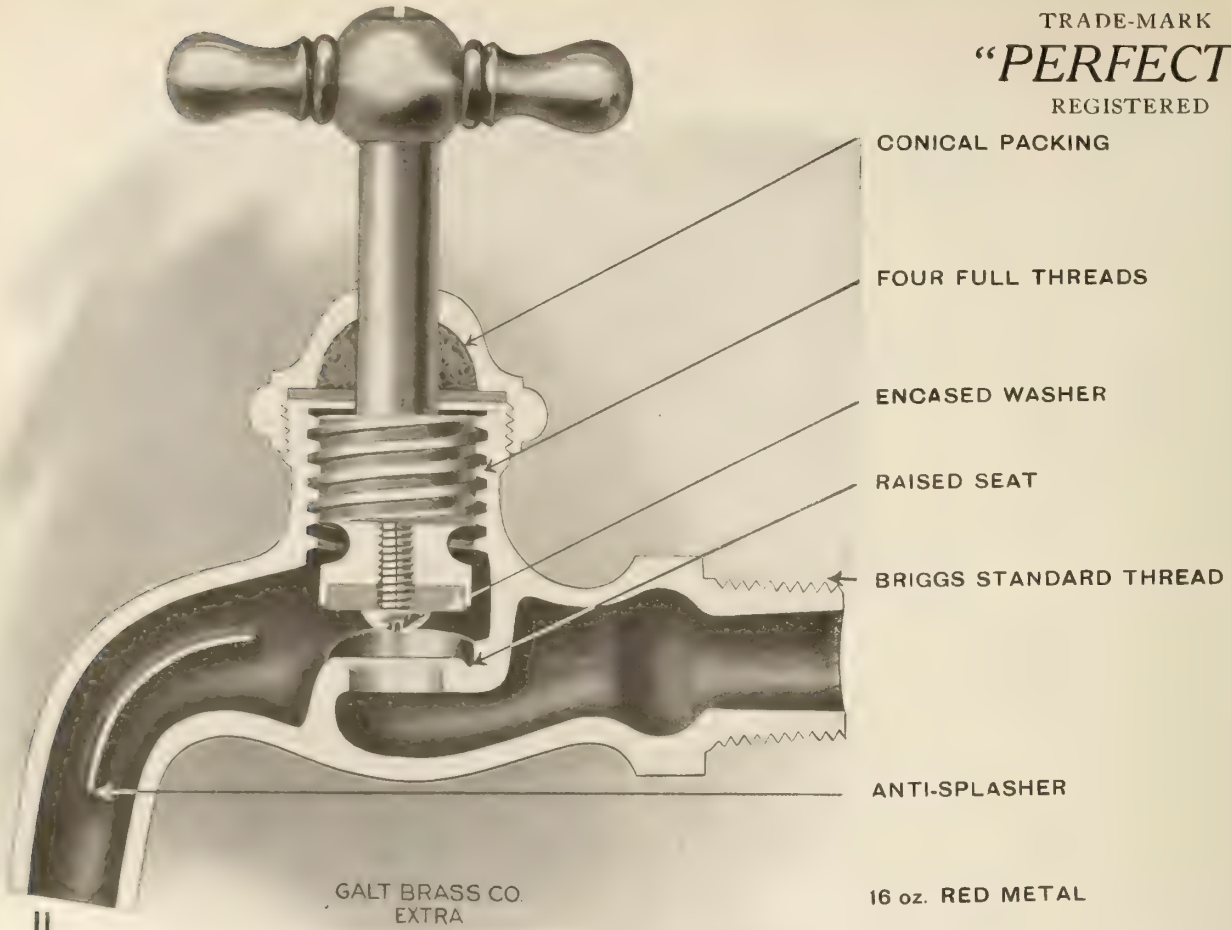

The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER

PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol X. Publication Office: TORONTO, FEBRUARY 15, 1916 No. 4

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Enameled All-over

VICTOR ONE-PIECE BATH

Enameled Inside

FILE COPY

The principle of the Victor Bath is a tub body cast integral with a Base and Wing Plates: the latter in various positions on the Tub Body to make the various Combinations, viz.:

Open Type
Corner Type
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End to Wall Type
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Also with Extension Rim at End or Back for fittings—thru rim.

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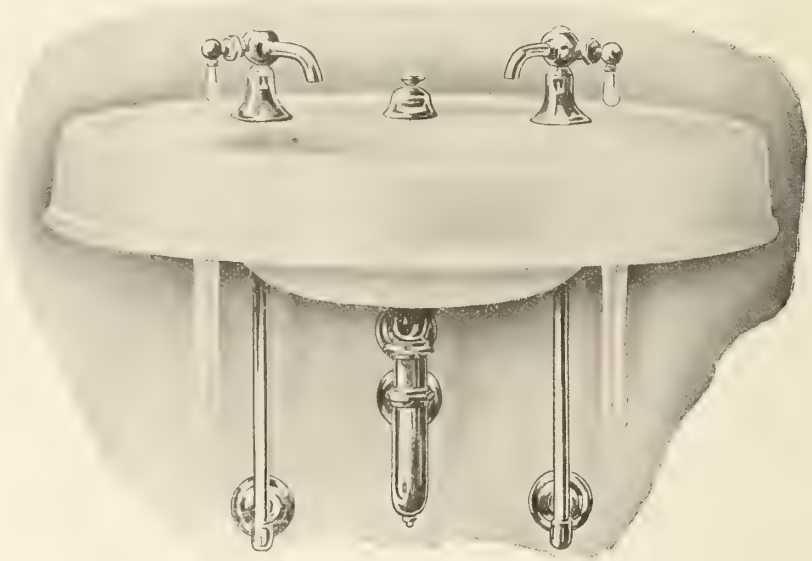

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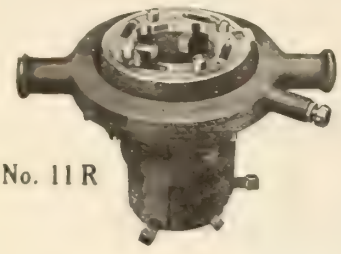

No. 11 R

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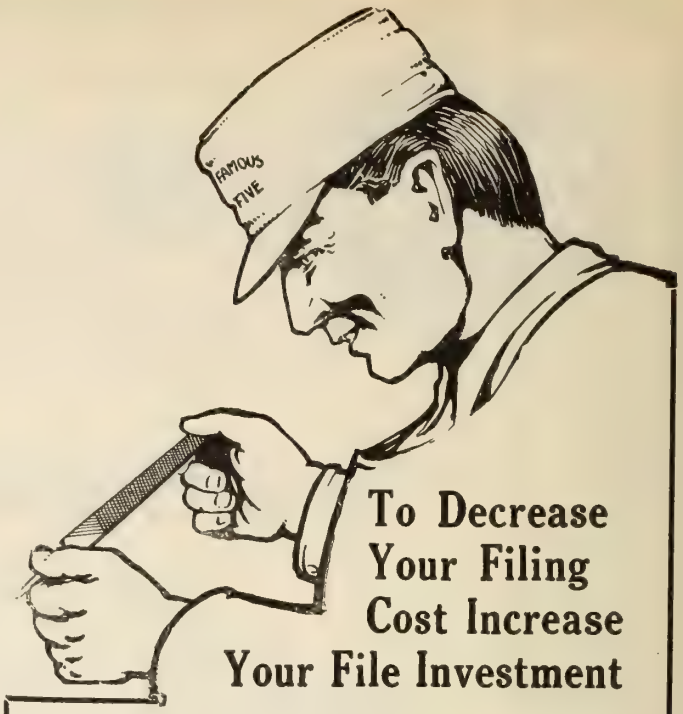

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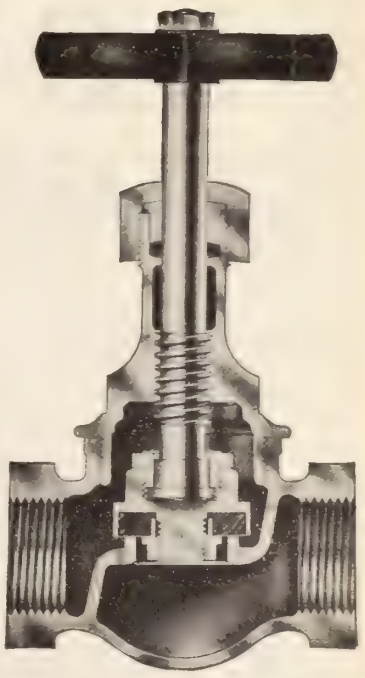
Send for Catalogue No. 8—it contains lots of useful information about valves. The Registration numbers covering our entire line are listed therein.



Sectional View
Fig. 106
Standard Pattern
Brass Globe Valve
Screwed

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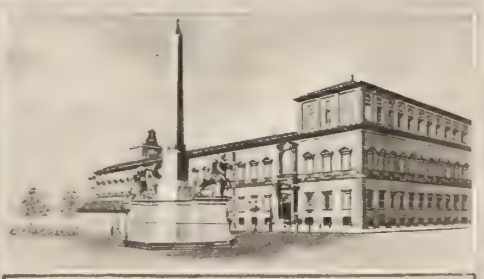

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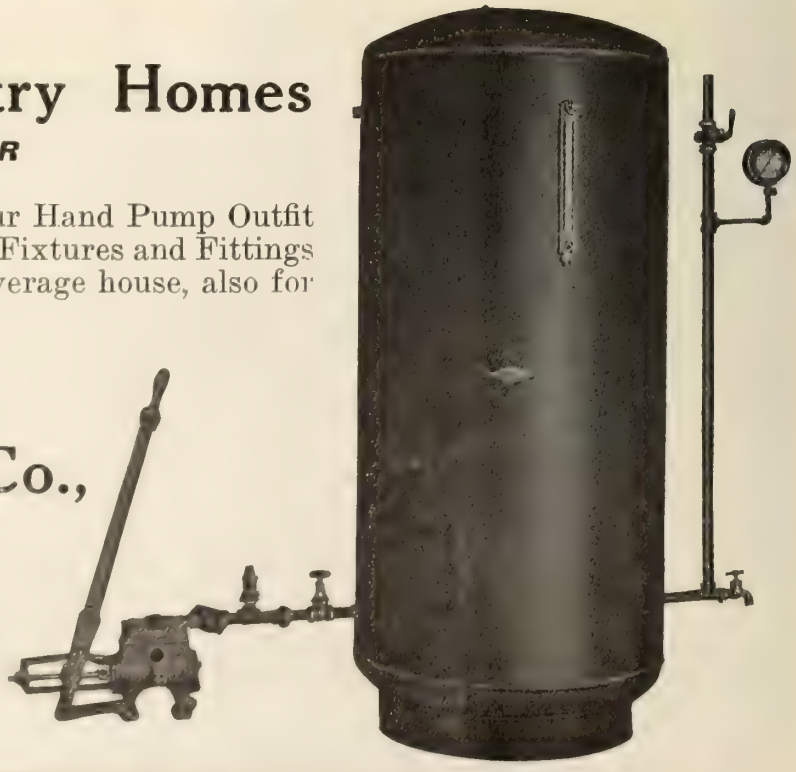

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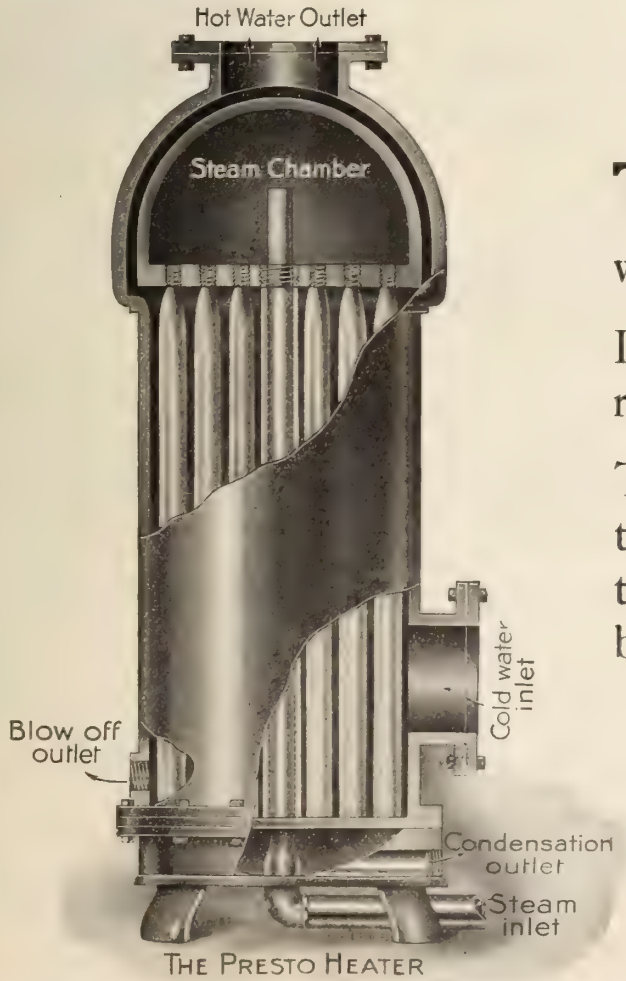

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SANITARY ENGINEER
PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, FEBRUARY 15, 1916 No. 4

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EDITORIALS

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THE SANITARY ENGINEER

VOL. X. FEBRUARY 15, 1916 No. 4

Possibilities for the Dreamer

Dreamers Have Done More Than All the Self Satisfied "Can't-Be-Done's" Ever Did or Will Do—To be Successful One Must Get Worked Up, Become More Enthusiastic, and be Ready to Serve.

DREAMERS in all ages have been condemned and rewarded—on one basis only—whether dreams come true. "It's not practical" more often implies lack of imagination on the part of the critic than a surfeit of knowledge. The motor car for $390 was nothing but a thread-bare yarn until Mr. Ford actually produced 1,000 for every working day in the year.

If a farmer had predicted concrete and macadam highways a century ago he would have been burned at the stake.

We are spending millions of dollars to grow two blades of grass where one now grows—we are concerned with intense production. Good—but how about sanitary and heating, the furnishing of an adequate water supply, and all other kinds of science which can make the farm house a real home?

Nineteen sixteen is the year for men in all walks of life to decide whether they are themselves beaten, or whether they can look into the future, bring their imaginations to a focus, and say "it can be done."

Old ideas of business-getting must be knocked on the head—new ones of service conceived. Are we going before the people of the country this year with the same old message, or are we going to show these people how to enjoy life at a less real cost to themselves? Not just money cost.

Let us just look at our own case. We are going along in the same old way. We are not responding as we should to the call of the farmer. We do not mean to infer that farmers are falling over themselves to get sanitary and heating appliances installed. No, not by any means.

But here's the point. Can any one of our readers imagine one single profession that can do more for the farmer with a less amount of capital outlay than can a sanitary and heating engineer?

Well, then, such being an admitted fact, all we can say is "Go to it."

It is simply painful to hear the wail of the city craftsman about bad business when, on the other hand, we know of actual instances where one or two members of the craft have got out of the city rut, have gone further afield, and have actually got all the business they could handle.

Just let us picture what the automobile industry has done. These men who to-day are looked upon as having done wonders were men who dreamed dreams. They put dreams into practice.

Look at the aeroplane. Can anyone tell what will be the outcome of this wonderful machine? The direct results of a dreamer. Jules Verne dreamed of flying men and machines, and other men put these dreams into practice. Steam engines and steam power were in use 200 years before Christ. But because of the self-satisfied "can't-be-done's," there was a lapse of a thousand years before we hear of steam as a power again. Why is it that the farmer to-day has the finest facilities for plowing, sowing, reaping and threshing his corn? Because McCormick dreamed. Because he surmounted a million difficulties which a million "can't-be-done's" gave up in despair. Brother craftsmen, do you know how it was that these men surmounted these million and one difficulties? Because they asked these "can't-be-done's"! WHY.

The sanitary and heating engineer who sits in his office or his home and declares that he can't get business, is another "can't-be-done." He is admitting that he's beaten. There's no other alternative.

But here's another question:

What did McCormick say when he met with the opposition which he ran up against?

WHY

ARE WE BUSY?

WHY

ARE WE NOT?

Quit keeping company with

CAN'T BE DONE'S

You'll then become one of the

WHYS

(WISE)

NEW CENTRAL TECHNICAL SCHOOL

TORONTO, ONT.

The year 1915-16 will be memorable in the annals of technical education in Canada. The additional facilities afforded by the new building were expected to be more than ample, but the excellence of the arrangements has so increased the demand for tuition that overflow attendances in all departments have taxed the new institution to the limits of its capacity.

IN the year 1891 A.D. the City of Toronto organized evening classes, which were held in a building known as Wycliffe Hall, the classes being conducted under the name of the Toronto Technical School. Ten years later the increased demand for technical education had necessitated the purchase of a building of considerable size adjacent to the University buildings, day classes being added to the evening classes at this time. In 1904 the Technical School Board, the High School Board and the Public School Board were replaced by the present Board of Education, and under this board the school was organized as a Technical High School.

In 1911 the school was placed under the management of an Advisory Industrial Committee, appointed by the Board of Education. This committee consisted of twelve persons, six of whom were selected from the Board of Education, and six from the manufacturing or other industries, three of the latter being employers of labor or directors of companies employing labor, and three being employees.

In November of that year, and twenty years from the organizing of the original Toronto Technical School, the Advisory Industrial Committee, acting under the recent Industrial Education Act, adopted a scheme of reorganization, which culminated in the erection and equipment of the magnificent edifice known as Central Technical School, Toronto.

A. C. McKAY, B.A., LL.D., PRINCIPAL OF NEW TECHNICAL SCHOOL

In conjunction with the Central School are four branch technical schools, which are situated in selected locations in the suburban districts; but it is with the Central School, its building, its equipment, its facilities for the dissemination of knowledge, and its devoted staff and enthusiastic pupils, that this article deals with primarily.

Instances frequently come to light where men, handicapped by lacking of opportunity for acquiring knowledge in their young days, have succeeded in surmounting many difficulties and ultimately achieved notable success in industrial life. The world-wide recognition of the value to a nation of an intelligent, educated population, trained to develop its own leaders and workers in industrial life, has been the compelling force of the immense advance in technical education in the

leading civilized countries. The phenomenal development of all classes of industry in America during the last three decades has been facilitated in no small degree by the efficient and complete education offered by numerous scientific schools and institutions which have kept in close touch with the leading manufacturing concerns on the continent.

In the university departments of applied science in Toronto and Montreal, Canada has excellent educational institutions, which enable scientific knowledge to be acquired in a high degree of completeness, but the great number of young people desiring to acquire a useful knowledge of arts and crafts, trades and special industries, have not been given the facilities which are their moral due.

The scheme of reorganization adopted by the Advisory Industrial Committee stated that in the Central School there should be organized the following courses:

For Day Pupils:—

(a) Industrial courses (general and special), extending over four years for boys, and over three years for girls; one-half of the time in the last two years in each course to be devoted to actual shop practice.

Pupils to be admitted to these courses are required to present a certificate of having obtained at least fourth form standing in a public or separate school.

(b) Matriculation courses, extending over four years, admitting to university departments of applied science and household science.

Pupils to be admitted to these courses are required to be duly qualified to enter a high school.

(c) Special short courses of theoretical and practical technology, including courses for part-time students; pupils to be admitted at the discretion of the principal.

(d) Courses in fine and applied arts, with special adaptation to the industries; pupils to be admitted at the discretion of the principal.

For Evening Pupils:—

(a) Industrial courses, with practical demonstrations under the direction of skilled workmen, open only to those actually engaged in the trade or occupation.

(b) Technical courses, including theoretical and applied mathematics.

(c) Art courses, with special adaptation to industries.

(d) Domestic science courses.

A study of these provisions reveals to a slight extent only the amount of detailed labor and thought involved in organizing the new educational plant. To remove an organization with its existing equipment, which was already of considerable proportions, into new quarters six or eight times as large, to increase the staff, to extend the equipment, to maintain every administrative and executive detail in a high state of efficiency, and then, in spite of all precautions, to be overwhelmed with an avalanche of students beyond all previous estimation—such in brief has been the fortune of Dr. A. C. McKay, B.A., LL.D., principal of Central Technical School.

DEPARTMENT OF SHOPWORK. CARPENTRY SHOP IN WHICH STUDENTS ARE TRAINED TO BECOME EXPERT IN MANUAL WORK.

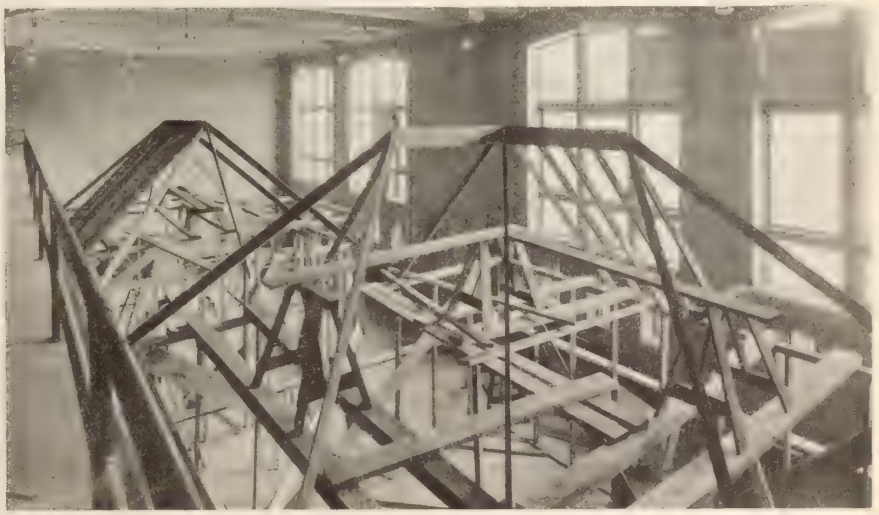
The site of the school extends to about six acres, and occupies two city blocks. It is bounded by Lennox, Harbord, Borden, and Lippincott Streets. The main entrance is on the west side facing Lippincott Street, the length of the building north and south being 430 feet by 227 feet deep, and four storeys in height. The size of the site allows for the accommodation of a football field at the north end and tennis courts at the south end. The location of the school is in the geographical centre of the city, and two main car lines, within a minute's walk, render it easy of access from all parts of the city.

The appearance of the building is decidedly imposing, the style of architecture being of Gothic character, while the exterior is of local limestone laid upon Scotch rubble masonry.

Three of the principal architectural features of the building are—the principal's office, which is also used as a board room, the library, and the auditorium, views of which are reproduced.

The auditorium is 80 feet broad and 90 feet long, consisting of a main floor and gallery. It has a seating capacity of almost thirteen hundred persons.

Elaborate arrangements are provided for the comfort and convenience of teachers and pupils. Nine locker rooms, with 1,000 steel lockers; bicycle room



DEPARTMENT OF SHOPWORK. VIEW OF THE CONSTRUCTION ROOM WHERE STUDENTS IN THE BUILDING TRADES TEST THEIR SKILL ON A LARGE SCALE.

DEPARTMENT OF SHOPWORK. ONE OF THE ELECTRICALLY OPERATED LATHES IN MACHINE SHOP ON WHICH STUDENTS PERFORM INTRICATE OPERATIONS.

for 400 bicycles; gymnasium, 90 ft. x 48 ft., with complete modern equipment; swimming pool, 50 ft. x 25 ft., twenty-four showers, and forty dressing rooms, indicate to some extent the completeness of equipment in this respect. The provision of individual steel lockers is in line with the best modern practice, from the point of safety as well as hygiene. In common with most of the efficiency features of the building, these lockers were made in Canada, being the standard product of the Dennis Wire & Iron Works Co.

Thirty standard class rooms are provided, all being fitted with individual desks or tables and movable chairs. Cloak rooms, toilet rooms and assembly rooms, with the necessary offices, complete the equipment features of the institution.

The laboratories and shops, in which our readers are more directly interested, are mostly situated in the basement or Floor A, the principal exception being the chemical laboratories, which, for ob- [illegible] are located on the upper floor.

Studies and Equipment

[illegible] young men extends over a period of four years, and is designed to prepare them for the pursuits of industrial and commercial life. In general outline it is similar to the matriculation course, except that the latter portion is devoted to the attainment of practical knowledge and personal skill in the branch of industry which the student intends to follow; while in the matriculation course, the studies are directed to qualify the student for further intellectual development in the university.

The subjects covered by the industrial course include mathematics, physics, chemistry, mechanical drawing, freehand drawing, shop work, English, drill, gymnastic and swimming exercises; these studies being supplemented in the last year by such special subjects as geology and mineralogy, steam engine and power plant, architecture and building construction, estimating, clay modeling, printing — practical composition and press work; practical painting and decorating, metallurgy and assaying, and electro chemistry.

Of chief interest to engineers is the equipment provided for the study of physics, shop work, engineering and chemistry. These four subjects are of prime importance to the technical student, and the school authorities have shown their recognition of this fact in the liberal equipment provided for the study of these subjects.

Physical Laboratories

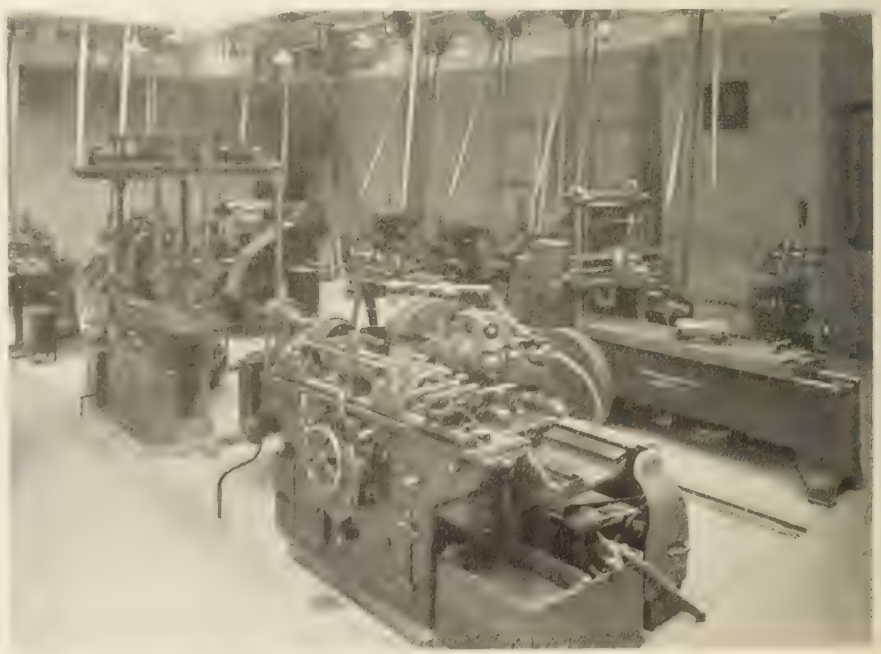
The study of physics forms part of all branches of the industrial course. It commences during the first year with electricity and magnetism, fluids and heat, with developments later in mechanics, heat, light, etc.

Four physical laboratories are provided on the main floor, two being equipped for general physics and two for special work in electricity and light. These rooms are all provided with special low-voltage direct currents, as well as with the usual alternating and direct currents.

Department of Shop Work

The value of a thorough training in shop work has long been recognized by the authorities, and the former equipment has been greatly enlarged and modernized to accord with present-day developments of machines and apparatus.

There are seven rooms devoted to instruction in woodworking alone, viz., two elementary shops, two pattern shops, one cabinet shop, one carpentry shop and one mill room. In addition to these, there is a construction room, 80 feet long, 37 feet wide, and 30 feet high, affording ample space for the erection of two moderate-sized dwelling houses at one time. Here the students of various trades are afforded facilities for performing their work under actual every-day conditions. Carpenters erect the framing, assemble interior finish, etc.; plasterers perform their work on select-



DEPARTMENT OF SHOPWORK. VIEW OF MACHINE SHOP, SHOWING GRINDING MACHINES, REVERSING MOTOR PLANING MACHINE, AND SHAPERS IN BACKGROUND.

ed parts of the building; paperhangers, wiremen, gasfitters and plumbers all receive opportunity for testing their ability to carry out the work of the shops devoted to instruction in Plumb- various trades involved.

Building Trades

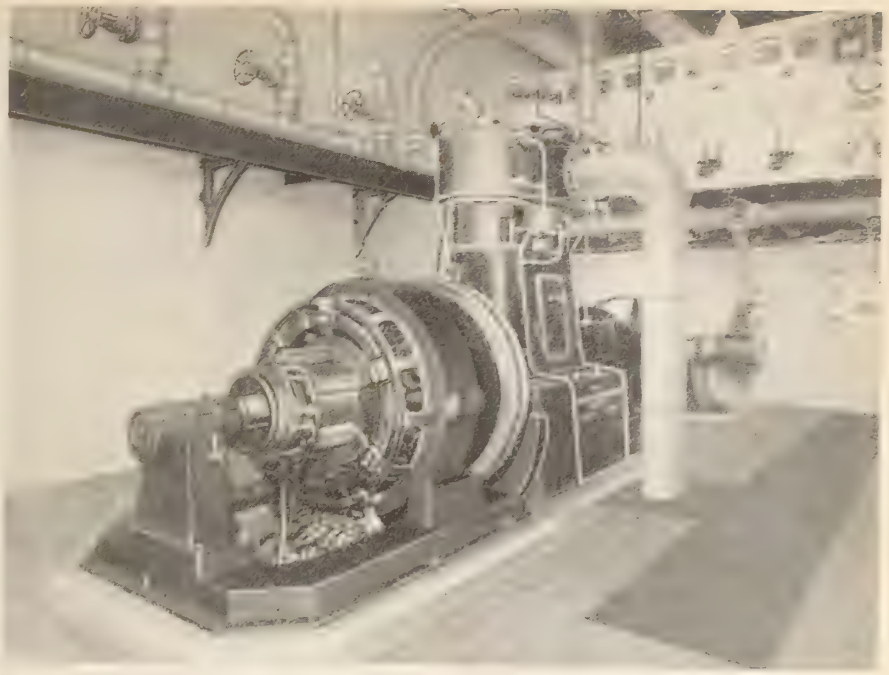
Included in the above category are ing and Steamfitting, Electrical Construction; Brickmaking and Bricklaying: Cement and Stone Work, and Plaster Decoration.

Through the kindness of interested firms, the brick department is equipped with a pug mill, a soft-mud machine and a stiff-mud machine, the latter having a wire cut table. The other trades mentioned are well taken care of so far as instruction and equipment is concerned, all modern tools and apparatus being on hand. The final test, of course, is trying out the students under practical conditions, and it is in connection with this that the value of the construction room becomes so evident. The present stage of construction includes the erection of frame dwellings and each of the building trades classes is afforded opportunity of carrying out the work under actual house-building conditions. Plumbing, wiring, plastering, wallpapering and all decoration work is performed on a suitable scale so that maximum instruction is given on each subject.

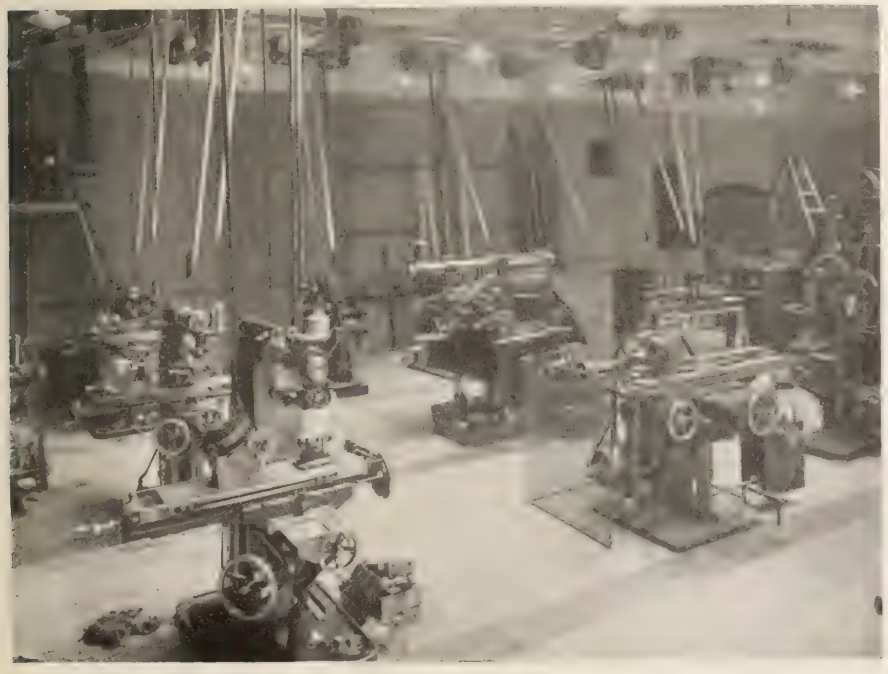
In the near future it is intended to make a more complete effort in which the work will be a two-storeyed brick school shop and laid by the school class.

Architecture and Design

The theoretical side of building and machine work is well taken care. Four class rooms are assigned to the architectural classes and four to the mechanical classes. One of the former, devoted to the teaching of elementary architecture, contains forty-five individual drafting tables. The mechanical rooms are also furnished with individual tables, all of the rooms being provided with a universal blackboard drafting machine. Blueprint rooms are situated on the roof of the building and are equipped with a continuous printing machine, while frames for sun printing are also supplied.



365 HORSE-POWER, COMPOUND, VERTICAL, ENCLOSED, QUICK-REVOLUTION ENGINE WITH FORCED LUBRICATION, AND HORIZONTAL SINGLE CYLINDER, CENTRE CRANK ENGINE, BOTH OF GOLDIE & McCULLOCH MAKE.



DEPARTMENT OF SHOPWORK. GROUP OF MILLING MACHINES IN MACHINE SHOP.

Department of Chemistry

The chemical department includes seven distinct laboratories for the following special purposes, viz.: Elementary Chemistry, having working accommodation for sixty students and locker accommodation for five hundred students; Industrial Chemistry, provided with three fume closets, working tables and lockers for forty students, and special apparatus for various trades; Qualitative Chemistry, fitted up with special drafts, and a large fume closet for the hydrogen sulphide generator. There are working places for forty students; Qualitative Chemistry, accommodating forty students and provided with fume closets, D.C. and A.C. current, compressed air, steam and dying ovens.

Power, Light and Heat

The engineering department of the new Toronto Technical School comprises the entire power plant, heating and ventilating system, air compressor plant, refrigeration plant, elevators, hot water service system, the various auxiliaries and the experimental engine laboratory. The engineering department is one of the most important in any technical school and in this case no expense has been spared in getting the best equipment and installing it to the best possible advantage to meet the requirements of an institution of the kind. The power plant, for instance, in addition to furnishing light, heat, etc., for the building, can also be turned to good account for the benefit of the students, although primarily it is intended for the former service.

(Continued in next issue.)

Pneumatic Water Storage and Supply

Pointing Out the Governing Principles of the Pneumatic Water System—All Systems Should Provide For Furnishing Air to Replace Loss by Absorption

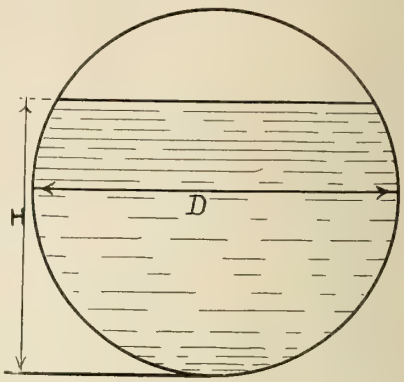
By R. O. Wynne-Roberts, Consulting Engineer, Temple Building, Toronto

THE application of this system of water supply for institutions and small towns does not materially differ from that in the case of residences, farms, etc. There is generally an attendant, a part of whose duty is to look after the plant and to maintain an adequate supply and pressure; consequently the available storage capacity of the tanks can be proportionately less per head served. It is, however, inadvisable to make a serious reduction in the relative storage capacity, because, in the case of outbreaks of fire, there will be a sudden and greatly increased demand for water. A one-inch nozzle will deliver about 150 gallons per minute under a pressure of 35 lbs. per sq. inch at the nozzle. Under this condition 1,000 gallons will be absorbed in about seven minutes, unless the pumps are large enough to maintain the supply and pressure. One nozzle will generally be insufficient to extinguish a fire unless the fire is attacked in its incipient stage.

It has already been explained that the available storage capacity of a tank depends upon its total capacity and the air pressure when the water level is at its lowest point. The minimum pressure required is, say, 30 pounds, or 45 pounds absolute, and this pressure must be maintained when the tank is nearly empty. The maximum pressure when the tank is two-thirds full of water will be $45 \times \frac{V}{A}$ (V = total capacity of tank, say, 100 units, and A = air capacity when the tank is two-thirds full—that is, 33 1/3 units). Therefore, the maximum pressure will be $45 \times \frac{100}{33\,1/3} = 135$ lbs. absolute, or 120 lbs. gauge. The available storage capacity must be, say, 1,000 gallons; then the total capacity must be $1{,}000 / \frac{100}{135 - 45} = \frac{1{,}000}{\frac{100}{45}}$.

What the available storage capacity should be depends upon the motive power employed, the attention the plant receives, and the quantity of water consumed daily. This subject has already been dealt with in the preceding articles. In the case of large institutions and small town systems, there should be an ample margin of available storage to meet contingencies, such as the hourly consumption, which should be carefully considered, because the maximum hourly consumption may be 2½ times the average. Suppose a village has a population of 1,000, the houses are all connected to the water mains, and that each person consumes on an average about 30 gallons per day for all purposes. That would mean a total average daily consumption of about 30,000 gallons, or an average of 1,250 gallons per hour. As the requirements vary each hour, there will be a fluctuating demand, the maximum per hour being 2½ times (or more) the average rate. Consequently, in this case $1{,}250 \times 2\frac{1}{2} = 3{,}125$. If a fire broke out at the time when the greatest quantity of water was being used for other purposes, and two jets were used to extinguish the fire, it will be seen that 300 gallons per minute would be required, or about six times the maximum domestic consumption. It is evident that it would not be economical to install pneumatic tanks to meet such a large supply, which might be required very occasionally. So that the pumps should be capable of meeting both fire and domestic purposes when needed, and the tanks used for the latter only. Each case must be studied on its own merits, and, therefore, no formula can be given to satisfy all conditions.

Pneumatic storage is useful for another purpose, namely, to store a supply for short periods when the town pressure is low. For example, if an institution obtains its water supply from the town mains it can be arranged that it



will pass through a pneumatic tank. It will thereby compress the air and create an elastic cushion. The institution has, say, 300 inmates, and the average daily requirements are 40 gallons per head. Then the consumption will be 12,000 gallons per day, or an average of 8 1/3 gallons per minute. As the consumption is irregular, it will be necessary to provide for, say, three times this quantity, namely, 25 gallons per minute. Assume that the town pressure is 30 lbs. (that is 45 lbs. absolute), and that the top floor is 40 feet above the tank, which means that after allowing for friction in the pipes and pressure at the faucets, that about 23 lbs. gauge (or 38 lbs. absolute) will be needed at the tank. If no air is pumped into the tank, then the town pressure of 45 lbs. absolute will com-

To ascertain capacity or contents of Horizontal Cylindrical Tanks.

H/D	M	H/D	M	H/D	M	H/D	M	H/D	M
.01	.0013	.21	.1199	.41	.3032	.61	.5018	.81	.6817
.02	.0037	.22	.1281	.42	.3130	.62	.5116	.82	.6895
.03	.0069	.23	.1365	.43	.3230	.63	.5212	.83	.6973
.04	.0105	.24	.1449	.44	.3328	.64	.5309	.84	.7047
.05	.0147	.25	.1535	.45	.3428	.65	.5404	.85	.7119
.06	.0192	.26	.1623	.46	.3527	.66	.5499	.86	.7190
.07	.0242	.27	.1711	.47	.3627	.67	.5594	.87	.7259
.08	.0294	.28	.1800	.48	.3727	.68	.5687	.88	.7324
.09	.0350	.29	.1890	.49	.3827	.69	.5780	.89	.7384
.10	.0409	.30	.1982	.50	.3927	.70	.5872	.90	.7445
.11	.0407	.31	.2074	.51	.4027	.71	.5964	.91	.7504
.12	.0534	.32	.2167	.52	.4127	.72	.6054	.92	.7560
.13	.0599	.33	.2260	.53	.4227	.73	.6143	.93	.7612
.14	.0668	.34	.2355	.54	.4327	.74	.6231	.94	.7662
.15	.0739	.35	.2450	.55	.4426	.75	.6319	.95	.7707
.16	.0811	.36	.2545	.56	.4525	.76	.6405	.96	.7749
.17	.0885	.37	.2642	.57	.4624	.77	.6489	.97	.7785
.18	.0961	.38	.2738	.58	.4724	.78	.6573	.98	.7817
.19	.1039	.39	.2836	.59	.4822	79	.6655	.99	.7841
.20	.1118	.40	.2934	.60	.4920	.80	.6736	1.00	.7854

press the original bulk of air to one-third ($100 \times \frac{15}{45} = 33\ 1/3$). The town water pressure will occasionally fall below 23 lbs., and then the compressed air will act. Assume that the tank has a total capacity of 2,000 gallons, one-third of this will be air, leaving 1,334 gallons of water. When the town pressure falls off, the check valve on the inlet will shut, and the institution will be supplied from the tank, until the pressure therein falls to 23 lbs., or the town pressure recovers. So the tank will act until the water storage has been reduced for 1,334 gallons to $2{,}000 - \frac{15 \times 2{,}000}{38} = 1{,}210$ gallons. That means that 124 gallons can be drawn. This quantity can be increased by pumping in air. For example, if the air pressure at the start was 15 lbs. (or 30 lbs. absolute), then, when the town pressure was on, the quantity of water in the tank would be $2{,}000 - \frac{30 \times 2{,}000}{45} = 667$ gallons, and when the town pressure was off, the institution could draw until the tank pressure was reduced to 23 lbs. gauge—that is $2{,}000 - \frac{30 \times 2{,}000}{38} = 421$ gallons, $667 - 421 = 246$ gallons available for consumption, which is twice that in the previous case.

Pneumatic storage is useful for institutions even when supplied from town mains, for it conserves a quantity of water to carry over short periods when the town pressure is, for any reason, reduced.

To ascertain the capacity of a vertical cylindrical tank is a simple calculation. Suppose the height is 6 ft., diameter 3 ft., and it is filled two-thirds full, then the quantity of water will be $3 \times 3 \times 4.5 \times 6.25 = 225$ gallons, and the total capacity will be $3 \times 3 \times 6 \times 6.25 = 337.5$ gallons.

To ascertain the capacity of a horizontal cylindrical tank is not such an easy matter, and to overcome the tediousness of the calculations to arrive at the contents the writer has prepared the accompanying table.

H = height of water above the bottom in feet.
D = diameter of cylinder in feet. L = length of tank in feet.
Area of water segment = $D^2 \times M$.
Contents of cylindrical tank in cubic feet = $D^2 \times M \times L$.
Contents of cylindrical tank in gallons = $D^2 \times M \times L \times 6.25$.

Example.—A horizontal cylindrical tank is 4 ft. in diameter and 10 ft. long, what are the contents in gallons; and if filled two-thirds of diameter, what quantity does it hold?

Answer.—$4 \times 4 \times .7854 \times 10 \times 6.25 = 785.4$ gallons full.
$4 \times 4 \times .5594 \times 10 \times 6.25 = 559.4$ gallons at .66 level.

Fire Destroys the House of Commons

House of Commons destroyed by fire was a magnificent structure

THE Canadian House of Commons, destroyed by fire last week, was one of the finest monuments of Canadian architecture, and was admired not only by Canadians, but by travelers from all parts of the world.

The building was a picturesque landmark. Like the east and west blocks, the House of Commons, which stood in the centre of the group, was built of local sandstone, while the dressings were Ohio freestone. The building stood three stories high, and was 475 feet long. Surmounted by a crown and flagstaff, the main tower stood 160 feet in height. The building stood on a high elevation, and the old familiar crown at the head of the tower could be seen long before the traveler reached the Capital.

The architecture was of pointed Gothic style, and its massive appearance added an appropriate crown to Parliament Hill.

Under the administration of the Macdonald-Cartier administration in 1859 and the Governor-Generalship of Sir Edmund Head, the building of the House of Commons was conceived in the minds of Canada's statesmen.

The question as to where the capital should be became a vexed problem in Canadian politics. Quebec, Montreal, Kingston and Toronto each sought to have the legislators meet in these cities. The matter was finally left to the discretion of the late Queen Victoria, who decided upon Ottawa.

Work was begun on December 20, 1859, and was completed in 1866. In September of 1860 the Prince of Wales, afterwards the late King Edward VII., laid corner-stone on his Canadian visit.

The cost of the building was in the neighborhood of $500,000, but it was estimated, not long ago, that to erect today, similar in architecture and design, would cost in the neighborhood of $3,000,000.

Canadian House of Commons, destroyed by fire last week

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

Article 22

The Bacteriological Examination of Water

It has for some years been established that it is the bacterial pollution of water which most quickly reacts on the health of the consumer and conveys to him the seeds of disease. Any analysis that furnishes information in regard to the potability of a water is valuable, but the chief concern is to know whether the supply is free from disease bacteria. The preceding article dealt with the importance and significance of a chemical examination from a sanitary standpoint, showing with what degree of accuracy such an examination might indicate sewage pollution, bearing in mind the fact that in sewage there is almost certainly to be found disease bacteria ejected in human excreta.

It might be thought that the bacterial examination of water would quickly and satisfactorily determine the wholesomeness of the supply, but unfortunately such is not necessarily the case. If proper care is not taken in obtaining a water sample, bacteria out of the air and from other possible sources so add to the number of bacteria in the sample that the result is of no value. Further, if a sample has to stand for a number of hours before bacteriological analysis, bacterial growths take place that mask the original state of affairs. Hence, samples sent some distance to be tested can only be safely examined by the chemical tests. Again, the number of disease bacteria in a water sample as compared to the total number of bacteria is small, and it has been proven almost impossible to readily determine the presence of disease, such as typhoid, bacteria in a polluted water sample.

In sewage there are millions and millions of bacteria from the excreta and other sources that are not disease bacteria. The disease bacteria and other harmless intestinal bacteria grow best at blood heat, or that which they meet with in the bowels. Hence, in sewage it is probable that they do not increase, although they may exist for a long time, depending on the conditions. If a sample of sewage polluted water is examined, it may be found difficult, on account of the other bacteria, to determine the presence of intestinal bacteria, and very difficult, as explained, to directly prove if disease bacteria, such as typhoid, are present. In the intestines of man, and also of warm-blooded animals, there is, however, one species of bacteria, the bacillus coli communis, commonly designated B. coli, that is so constantly present that it is generally known as the fecal bacillus. It is comparatively easy to detect, and the presence of B. coli is generally taken as conclusive evidence of sewage pollution. And sewage pollution nearly always means a typhoid infected water.

There are evidently two kinds of bacteriological tests that can be made—one to determine the total number of bacteria, a quantitative analysis; the other to determine the kind of bacteria, a qualitative analysis.

Quantitative Analysis (the Number of Bacteria in Water)

Bacteria are, of course, altogether too small and much too scattered in a water sample to permit of individual recognition by means of even the highest powered microscope. As has been explained, bacteria are, therefore, grown in suitable culture media, and each bacterium develops into a colony. A quantitative analysis consists in counting the number of colonies that grow from one cubic centimeter (approximately one-third of a teaspoonful) of the sample. The number is termed the bacterial "count." It may be taken as a general rule that the higher the count the more likely is the water to be polluted, but there are many conditions affecting the result.

Surface Waters

The number of bacteria in surface water depends on many factors, some of which might be enumerated as the supply of bacterial food in the water, the season and climate, the rainfall with the resultant washings of soil bacteria into lakes and streams, the sunshine, the velocity of the current, and the depth of water in streams and rivers. Then, of course, the effect of sewage pollution is to greatly increase the number of bacteria. In sewage there may be actually 10,000,000 bacteria per cubic centimeter, and the organic matter in the sewage provides excellent food for the bacteria already in the water.

The natural tendency in running streams or other bodies of water is for the organic matter from soil surface washings, or from sewage to become changed to unobjectionable matter, or to entirely disappear. This is brought about by bacterial action, which is greatly aided by sunlight and the oxygen dissolved in the water. But this change or disappearance of organic matter which has been used as a food by the bacteria necessarily results in the death of the bacteria, due to lack of further food. Thus is nature's process of self-purification accomplished.

On account of the various factors mentioned, the bacterial "count" of a fairly pure river water might range from, say, one hundred to several thousand bacteria per cubic centimeter. As a matter of interest, it might be noted that in milk (which is an excellent medium for the growth of bacteria, which mostly settle into it out of the air, from various sources) there may be found millions of bacteria per cubic centimeter—some cities place the limit at 500,000 per c.c., and exceeding that, the milk is condemned. None of these are necessarily disease bacteria, but the probability of the presence of disease bacteria naturally increases with the number of total bacteria present. Fig. 53 shows some disease bacteria that, according to Lipman, may be found in milk. Healthy cows, sanitary stables and surroundings and the immediate cooling of the milk should however enable the milkman to keep, without pasteurization, the bacterial count in milk to about 10,000.

Now, 10,000 bacteria per c.c. in a river water supply would almost certainly indicate pollution. The difference arises in the fact that the milk arrives at a suitable temperature, and contains desirable food for the bacteria. Water is generally at a lower temperature, which does not stimulate bacterial growth and, as explained, the oxidizing effects of sunlight and running water, etc., tend to destroy the bacteria. After a water sample has been collected, the conditions are more favorable for growth. A sample that had only 143 bacteria per c.c. when collected, was found after standing for three days to contain over 328,000 bacteria per c.c.

Well Water.

The soil is ordinarily a good filter. It filters out the bacteria and the water of deep wells and springs is consequently often nearly free from bacteria, the number varying from 4 or 5 to 150 bacteria per c. c. A higher count is an almost sure indication of direct leakage of surface water or sewage into the well. A shallow well might show the same count without causing any suspicion because, being nearer the surface, the normal count of bacteria from the soil is greater. That the opportunity for pollution in a shallow well is evidently much greater than in a deep well has been previously pointed out, but it is a point that can bear repeated emphasis.

Oridnary wells of medium depth contain from 100 to 2,000 bacteria per c. c.

Qualitative Analysis (the Kind of Bacteria in Water)

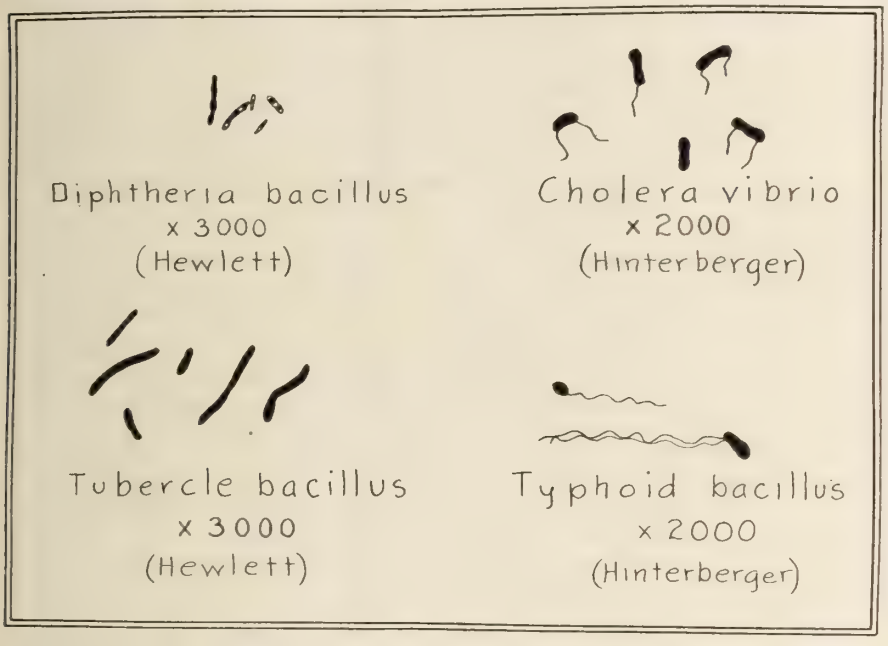
There are groups of bacteria that ordinarily live in water. These bacteria are found to a greater or less extent in all drinking waters, and may be considered normal inhabitants. Bacteria get into water from other sources, as from the soil and from sewage. Also the dust particles of the air are blown over and into bodies of water. Some of these bacteria find conditions favorable, and can develop in drinking water. However, the majority of soil and sewage bacteria though frequently found in drinking water, should really be regarded as strangers there. Large numbers die out rapidly, due to the competition of the bacteria more accustomed to the conditions, the lack of suitable food, or to the unsuitable temperature of the water.

One authority, referring to the number of species of bacteria to be permitted in a drinking water before it should be condemned, arbitrarily limited the number to ten. That is to say, if there are over ten different species of bacteria found in a water sample it would by such a rule be condemned as unsafe. Undoubtedly a polluted water would likely contain more species of bacteria than a safe drinking water, but on account of varying conditions it is hard to name any definite figure in this connection.

Bacillus Coli Communis

As this bacterium is so constantly present in sewage and in such comparatively large numbers, the most important qualitative test on a water sample becomes that of an investigation of the presence of B. coli.

As B. coli grows best at blood heat, at which it flourished in the intestines, the bacteria are, therefore, generally grown at 37 degrees Centigrade or 98 degrees Fahrenheit, the normal body temperature. After the colonies are produced, numerous tests are necessary to determine whether or not B. coli is present.



In sewage it has been stated that there are ordinarily about 100,000 colon bacilli in a c. c. If sewage is present in large quantities in water there are many evident ways already described in these articles to determine that point. It is only when the pollution is so slight that ordinary tests fail, that the bacteriological examination is so important. In the polluted water of the Niagara River, near its mouth, there was found by test to be 4,000 bacteria per c. c. Only about 100 of these probably were colon bacilli.

It is unfortunately not possible with the methods used to directly count the number of colon bacilli per c. c. All that can be done is to determine the presence or the absence of B. coli in certain quantities of the sample. In the case of the Niagara River water it was commonly found present in 0.01 c. c. samples. This probably means that in 0.001 c. c. samples it was normally absent. It would, of course, have been found in 0.1 c. c., 1 c. c., or 10 c. c. samples; in fact, in any amounts over the 0.01 c. c. samples in which it was found commonly present.

For a drinking water it is generally demanded that in 10 c. c. samples there shall be no indication of B. coli. If a 100 c. c. samples were examined, the presence of B. coli might be detected, but this would mean that the colon bacilli were present in very few numbers in the water sample, so few, that it is taken not to mean sewage pollution. There are other possible sources of B. coli other than from sewage, and in sewage, colon bacilli are found in comparatively large numbers as compared to those from other sources.

Typhoid bacteria, the important disease bacteria, found in water and the colon bacilli are so similar in many respects that it is probable that the one would exist as long in a water supply as the other. If B. coli is not found in a water sample after reliable analyses, it is safe to assume that typhoid bacteria have also ceased to exist. Under certain conditions colon bacilli may last as long as three or four weeks in a water supply. In ice and frozen excreta it has been mentioned that typhoid and, no doubt, the colon bacilli as well, can live until the warm weather comes. Then in a few weeks they must perish. But before this they may reach a water supply. If a bacteriological analysis is made, B. coli will indicate the presence of the typhoid bacteria. If such an analysis is not made and the water is drunk by an unwarned consumer, then, as in other cases of sewage pollution, he may suffer the penalty of someone's negligence by having typhoid fever.

(Continued in next issue.)

GAS LECTURE AT OTTAWA

The people of Ottawa were given an insight into the wonders of gas making, its history and development at a public meeting held recently in the Normal School.

G. W. Allen of the Consumers' Gas Co., Toronto, delivered the lecture, which was full of interesting and instructive points throughout and was well received by the numerous people in attendance. Over 140 lantern slides were used to emphasize the facts presented.

It would be interesting to know how many there are who have not thoroughly studied the possibilities of gas.

Gas is being utilized more today than ever in its history.

THE SANITARY ENGINEER

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FEBRUARY 15, 1916

THE CANADIAN OUTLOOK

EVERY business man in Canada has three sacred duties to perform if he wishes to succeed and at the same time see sound business principles established in this country. The first duty and perhaps the chief is to keep cool, to be cautious, though not over-cautious. Keep well in mind what may possibly happen if a cog slips in the machinery of one's business.

We are all aware of the thoughts which enter our minds when starting up in business and 90 per cent. at least of the business men in our particular line of calling have started from the rank of journeyman.

When most began, the sole thought was that the boss had and was making a big pile out of the results of our labors, etc., but what a rude awakening!

These awakenings are a result of not keeping cool, not weighing up all the pros and cons, the responsibilities which one assumes when entering upon a business career.

Most of us can ride the other man's horse better than we can ride our own, but the fact is we have not kept cool and mastered thoroughly our own horse.

BUILD FOR THE FUTURE

One of the worst evils in the sanitary and heating engineering profession is lack of foresight. When a certain low figure has been tendered on a given job, the tender is peddled round from pillar to post, with a view of getting a reduced price.

If every member of the craft would take a firm stand and, when Jones begins to hand out the "I can get the job done for $25 less kind of stuff," turn down all such work, these members of the craft would be building for the future. They would be making a profit on every transaction, plus establishing a good business.

It would be excellent reading to be able to figure how much per cent the sanitary and heating trade as a whole makes upon the total turnover. Another of our worst evils is our credit system. Many a hundred good men and true would have been better befriended had the jobber and manufacturer taken them to one side and explained that buying goods on credit is like spending one's money before they have got it, with a compound interest added.

There is credit and credit, but to hand out goods the way they are being handed out these days is little short of business suicide. Few and far between are those who have built up and established reputable businesses upon profits derived from goods bought on credit.

BUSINESS SHOULD EXPAND FROM ACCRUED PROFITS

We have cases every day coming to light where, because of a reasonable turnover of money, a business has been expanded, credit has been granted and all has gone on fairly well until a halt has been called, only to find that promiscuous granting of credit has resulted in ruin to those who have received the credit in spite of the big liability incurred, causing financial loss to the creditor to some extent.

No man being a debtor can ever be his best self whilst he is under obligation to his fellow man. He may appear to be indifferent, but no one can judge by appearances.

If sound business principles are to be the order of the day in Canada, our industries must be expanded and enlarged from profits made by those industries. Canada must produce more from her own resources, and borrow less.

CENTRAL TECHNICAL SCHOOL

IN this issue there appears the first of a series of articles which will no doubt be of interest to readers of THE SANITARY ENGINEER who are interested in technical education and the general advancement of the industrial worker.

We in Canada have reasons to believe that this new technical school is, without question, the finest and most completely equipped institution of its kind

in the British Empire. Technical education and progress go hand-in-hand. Technical schools will from now on become more appreciated than ever before, and particularly so when it is possible for a student to attend classes several afternoons and evenings during the week as well as follow his daily occupation.

No craft in the world will benefit as will sanitary and heating engineers because of the very fact that, while great progressive strides have been made in the trade, the cost to those who have been engaged in this calling has been too great.

Look at the brain and nerve-racking experience which some of the pioneers of the trade have gone through, which has resulted in such splendid installations. But as we said before, look at the cost.

We shall endeavor to show the readers of THE SANITARY ENGINEER not only the details which go to make the new technical school one of the finest, but also the most perfect in the appliances, which are furnished for the health of those students which attend this institution.

The first two articles will be devoted chiefly to the equipment which is furnished in connection with the educational departments, followed by the layout, plans of sanitary and heating installations, and we would strongly urge every reader to thoroughly study every line. By so doing, he will become well versed in the various systems which go to make a complete sanitary, heating and ventilating equipment.

A CALL FOR MEN, MORE MEN

EVERY reader of THE SANITARY ENGINEER has no doubt read that Canada is expected to raise an army 500,000 strong for overseas service.

The task of recruiting such an army is one of no mean order, but in spite of this arduous task the officers of the various battalions are doing great work.

The officers of the 9th Mississauga Horse, 170th Overseas Battalion, C.E.F., have worked out a splendid plan and hope to raise a sanitary and heating engineers' platoon. The idea is without doubt a splendid one. It is being endorsed by the Ontario Society of Domestic Sanitary and Heating Engineers as well as the officers of Toronto Local Union 47.

Men who have, in their daily life things in common with each other, will find it much more congenial than if amongst strangers. And as is explained in an article which appears on another page, the benefits derived are numerous. Those who are left behind at home are always sure of hearing from some one of the party, and men who enlist in this platoon will be fighting side by side with men of their own class.

Sanitary and heating engineers all over Canada have responded wonderfully to the call of their Mother Country. Thirty-three from one shop, that of Keith's Limited, Toronto, are now in the ranks. The head of this same concern has two sons in the army. Men, this is a fight for our lives, which of you would care to be German subjects this minute? Not one!

But if Kaiser Bill ever gets half a chance, that's what we shall all be.

There's not a man in Canada who would stoop to do the dirty work that the German is doing to-day and every day.

Good never was the outcome of an evil act, and the only way to put an end to this wicked war is to don the King's uniform and stamp out Kaiserism once and for all.

God Save the King.

EDITORIAL BRIEFS

THE AVERAGE person, whether employee or employer, spends nine-tenths of his life trying to save sufficient wealth to enable him to spend one-tenth in ease and comfort.

* * *

IF HE possessed a sufficiently good technical education he would make the whole of his working life one long period of industrial ease and comfort.

* * *

NO MAN can go through life and be reasonably successful if his work is done on the "hit-or-miss" plan. His efforts cost him too much and give him least returns.

* * *

THE DAY is fast approaching when the man who does not love to labor for his bread will be looked down upon instead of being looked up to and envied because of his earthly possessions as the idle non-producing rich are of to-day.

* * *

WHAT IS YOUR finished product? Is it a sanitary home, office or factory, or is it a congolomeration of piping which will be an everlasting liability to the owner?

* * *

IF OUR LABORS do not give the maximum of service in spite of price, we have allowed price to predominate.

* * *

IT'S AN OLD-TIME, worn-out joke that plumbers are "remembered by those they have done."

LET US IN future be remembered by "what we have done."

* * *

DON'T BE satisfied because you are holding your own against your competitors. You ought to be gaining on them.

"Sales Talks" With the Craft

A Series of Articles Which Will Show How New Business Can be Created and is Being Gotten by Adopting Such Suggestions as Are Related From Time to Time

By W. D. STOCKS

"JUST one moment, Stocks," interrupted Fenwick, "let me understand clearly what you are getting at. Now don't accuse me of getting up in the air when I say that it seems to me your argument is that I do not know how to fire a furnace, and similarly I do not understand the [illegible] business. I am only asking is that your contention."

"My dear fellow" I replied " you mistake my meaning entirely. If it were possible to fire a furnace with snowballs and ice chips I would back you to do it against any one. As far as knowing your business is concerned I need only remind you that last year I chose you from all my customers to do all the sanitary work in that new house of mine and I should hardly have done that if I had not had confidence in you.

"What I am saying, however, is that although you know the way to fire a furnace, you do not know how to utilize to the best advantage the heat you produce by such firing. You go at it hammer and tongs and make a good fire and there as far as you are concerned the matter ends. You will remember my calling at your place one evening about a fortnight ago when the thermometer was somewhere about 40 above. Well I noticed then you had a fire going fully big enough to have warmed your place thoroughly had it been at zero. It struck me at the time as waste of good fuel and energy. Now, if you don't mind my saying so, it is just the same [illegible] your business. You know your [illegible] ly but there is a big [illegible] n knowing one's business [illegible] points of view and knowing the best [illegible] You are pouring on the good fuel of energy: but as [illegible] dollars after 15 years work. [illegible] that, to keep up the [illegible], you are either letting the [illegible] you produce go to waste or you are not getting the heat you should in [illegible] the energy and knowledge [illegible] expending. Sometimes you do [illegible] more than is really necessary. Whether it is more time or more energy does not matter, the result is the same—not sufficient profit, not sufficient heat.

"Now I will endeavor to illustrate what I mean. On several occasions I have noticed your spending your own time on a job which could equally as well have been done by one of your men. Your time could have been better occupied in going out after fresh business, you were piling unnecessary fuel into the furnace and the heat was running to waste.

"Again, last month you sent me in an order for goodness knows how many elbows and tees of all kinds and sizes. Now, I am very glad to have all the orders you can give me, but I am quite sure you have a stock there enough to last you for a couple of years at least. In fact you must have at least a couple of hundred dollars lying idle there in that stock alone."

"Hold on a minute," said Fenwick, "do you remember about a year ago reading me a lecture on not keeping enough stock on hand? You are now taking exactly the opposite view."

"My dear fellow," I explained, "there are two extremes; the one is never to have anything on hand and to be always running short of every trivial little thing and the other is to overload yourself with four or five times the amount you really require. Now, when you start to fire your furnace does it enter your head to look at the thermometer and consider what sized fire you require? No! Well, you should. And in just the same way you should look through your books for the past year or two, when ordering stock, and see what has been your average monthly consumption of the various articles you require. This I know you do not do, as, in the case I mentioned just now, you sent me an order for the identical number of every sized elbow, whereas you know as well as I do that you will use four or five times the number of some sizes that you do of others. In your case if you should happen to have an exceptional demand for any one article you know you have only to phone down to me and you can get it the same day. It is not as if you were some three or four hundred miles away and would have to wait a week to get it. Therefore, I say, regulate your orders according to the thermometer records of your past consumption, adding, if you like, something to allow for an anticipated increase in the business. But do not go at it blindly with the result of having a large amount of capital lying idle in stock.

"I could carry on the simile farther, but I think I have said enough to show you what I want to say. And remember, Fenwick, my boy, in saying this I have my own axe to grind as well as yours. I was looking through my books last night and I noticed that your account with me for the past year was only very slightly above that for five years ago. Now, I am perfectly convinced that if you will take to heart what I have said in another five years' time that account, instead of remaining practically stationary, will have at least doubled or even trebled itself. That means so much more business for me. Do you see my point of view?"

A GOOD SUGGESTION

No Use Kicking Against the Pricks, but Rather Remove the Pricks

Several of the journals which are published to serve the plumbing trade and business have been waging an energetic campaign against the "joke-smiths" who still see something funny in the "plumber's bill" and the way in which some of the plumbers do their work. There is no doubt that much of this "joking" is as much out of date as the dodo bird, but any one who takes the trouble to investigate will lean to the opinion that a rap now and then still is deserved. **The surest way to kill off the breed of "plumbers' jokes" is for the plumbers themselves to give no occasion for them.** When all plumbers work efficiently, charging only for actual work done, advising only what is best for the health and comfort of the public, looking more to sanitary perfection than to financial profit, then will the "joke" against them cease to have point and die of inanition. Doubtless the campaign referred to will hasten the coming of that time, and so we wish it success—Valse World.

Practical Course for Sheet Metal Workers

ARTICLE No. 29 OF SERIES

By CHARLES SEIVERS

IN the problem described herewith is shown in elevation the view of a pediment A-B-C, resting on a flat surface as shown by A-C. The angle shown at B is a right angle, the mitres at A-P and B-E are also right angles, so that it is only required to develop one pattern for each mitre. Were the angle any greater or less, the mitre for each end would be different and would need to be developed separately.

At A-B-E-P, Fig. 1, are shown the two mitre lines B-E and A-D. Having drawn or laid out the angles, place or draw a section of the moulding in its proper position, seeing that the line on section marked wall line is at right angles to line A-B on elevation. It is necessary to place wall line of section at right angles to corresponding line A-B at Fig. 1.

Now divide the curved mouldings into a number of equal parts, and from each of these divisions and the angle at each straight member, draw lines parallel to A-B, until they intersect the mitre line B-E.

At right angles to A-B draw a line as shown at F-B, from which to measure from. Then draw two stretchout lines as seen at H-H and K-K, at right angles to H-H draw a line joining them as at H-K. On each of the two lines H-H and K-K, set off the spaces on section at Fig. 1, as shown by the numbers 1, 2, 3, 4, etc., and when set off, draw lines connecting 2-2, 3-3, etc. The pattern can be set off from either line H-H, or K-K, or any convenient line between. In this case a line between is used, F-G. Measure from line F-G at Fig. 1, to the mitre line B-F, on each of the lines drawn through the divisions in section, and set off from line F-G in pattern. Making sure that the distance on lines from the several points are placed on corresponding lines on pattern. When two points come on same line, as seen at 1 and 2, 10 and 11 and 12 and 13, the distance from measuring line to mitre line is the same for both points. When all have been set off, a line drawn through the points obtained will give pattern required.

The accompanying article is No. 28 of a course of practical problems for sheet metal workers prepared, especially for the readers of The Sanitary Engineer, by a practical mechanic who is constantly in touch with new problems which are arising in the sheet metal trades. These articles are a regular feature in The Sanitary Engineer, the only paper published in Canada in the interest of sanitary and heating engineering.

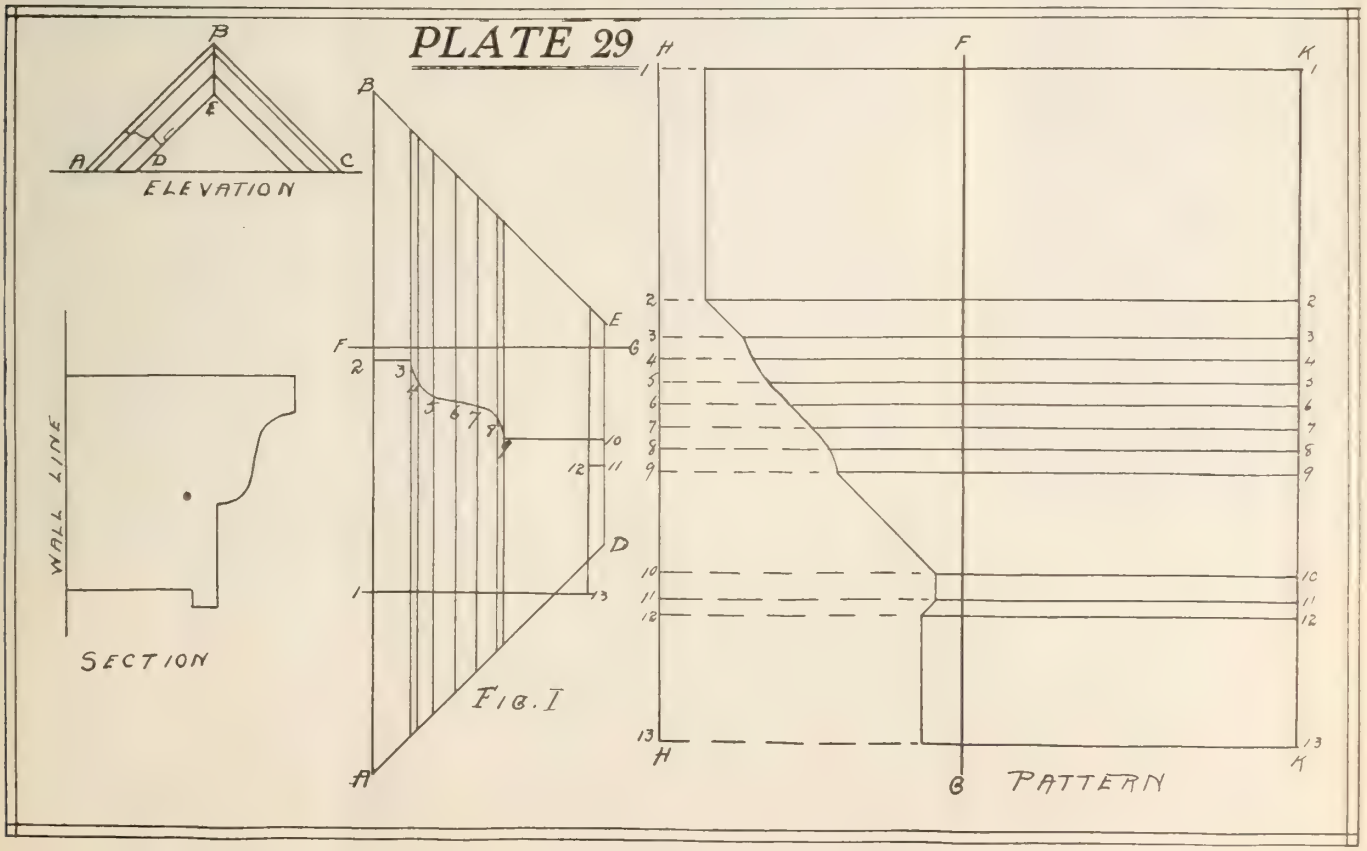
A CASE OF MISTAKEN IDENTITY

A certain well known contractor engaged on some rip-rap work in Texas employed a new man named Johnson and put him to placing stones. After about an hour's work Johnson went to the foreman and asked:

"Did you get my name as 'Johnson'?"

"I did," replied the foreman, referring to his time book. What of it?"

"I thought, from the job you gave me, that you must have it down as 'Sampson,'" said Johnson, as he walked off the job.—A. B. C. Texas.



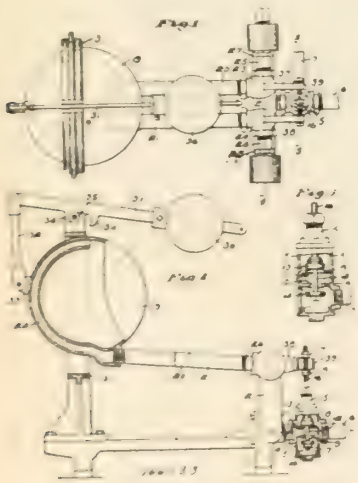
New Canadian Patents

No. 166,133

The Nashua Machine Company, assignee of Frank A. Littlefield, both of Nashua, New Hampshire, U.S.A., 23rd November, 1915; 6 years. Filed 27th September, 1915. Receipt No. 256,386.

Claim.—1. A steam trap comprising in combination a movable bowl, counterweighting means therefor, admission means for the water of condensation and steam, a reciprocatory valve stem having valves controlling the flow of water of condensation and steam, and an operating connection between the bowl and said valve stem, whereby the latter is operated by movement of the bowl, and outlet means for the water of condensation.

2. A steam trap, having in combination, a bowl support and provided with



No. 166,133. Steam Trap.

a steam inlet, and an inlet and outlet for water of condensation, two pipes pivoted upon said support and in communication with said inlet and outlet, a bowl mounted upon and in communication with said pipes, and a duplex valve operated by pivotal movement of said bowl, and controlling the flow of steam and water of condensation through said inlets and outlet.

3. A steam trap, comprising in combination, a bowl support having a steam inlet and an inlet and outlet for water of condensation, two pipes pivoted upon said support, one constituting a water outlet and the other constituting a water and steam inlet, a bowl mounted upon and in communication with said pipes, and a duplex valve operated by tilting movement of said bowl and controlling the water and steam flow through said pipes.

4. A steam trap, comprising in combination, a bowl support having a steam inlet and an inlet and outlet for water of condensation, two pipes pivoted upon said support, one constituting a water outlet and the other constituting a water and steam inlet, a bowl mounted upon and in communication with said pipes, and a reciprocatory valve stem operatively connected with and moved by tilting movement of said bowl, said valve stem having two valves controlling the flow of steam and water through said pipes.

5. A steam trap, comprising in combination, a bowl support having a steam inlet, and an inlet and an outlet for water of condensation, two pipes pivoted upon said support, one constituting a water and steam inlet and the other constituting a water outlet, a bowl mounted and in communication with said pipes, and a single valve means operatively connected with and actuated by tilting movement of said bowl to control the flow of water and steam through said pipes.

No. 164190.

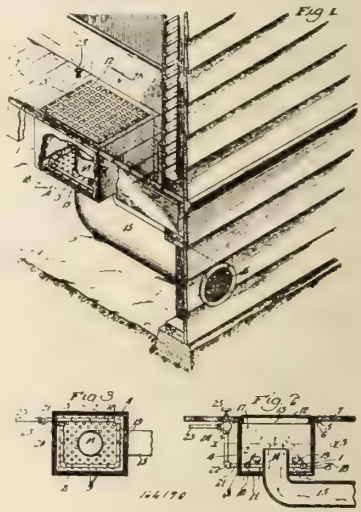
The Cole Manufacturing Company, assignee of Elnathan Cole, both of Los Angles, California, U.S.A. 10th August, 1915; 6 years. Filed 11th June, Receipt No. 252,752.

Claim.—A gas heater comprising a box forming a combustion chamber open at the top, said combustion chamber being supported in a floor below the same, and arranged to deliver the contents thereof into the room above the floor, an air inlet for said chamber extending upwardly through the bottom thereof from the exterior of said chamber, and combustion means in said chamber around said pipe.

2. A gas heater adapted to be supported in a floor comprising a box forming a combustion chamber open at the top and arranged to deliver the contents thereof into the room above the floor, an air inlet pipe extending upwardly through the bottom of said chamber, a gas supply pipe in said chamber around said air inlet pipe, and a series of jets in said gas pipe, directed upwardly and toward the open end of said air inlet pipe.

3. A gas heater adapted to be supported in a floor, said heater comprising a box forming a combustion chamber open at the top, an air inlet pipe extending upwardly through the bottom of said chamber, a gas supply pipe in said chamber around said air inlet pipe below the upper end therof, a series of jets in said gas pipe directed upwardly and toward the open end of said air inlet pipe valve means for said gas pipe exterior of said chamber, and a register in the top of said combustion and arranged to deliver the contents thereof into the room above the floor, the bottom of said box having a series of air inlet perforations therein.

4. A gas heater comprising a box adapted to be supported in a floor having an open upper end, a register in the floor over the upper end of said box and arranged to deliver the contents thereof into the room above the floor, said box forming a combustion chamber, an air inlet pipe for said heater having its inner end extending upwardly through the bottom of said box and its outer end to the exterior of the building, a gas pipe below the end of said air inlet pipe



No. 164,190. Gas Heater.

and extending around the upper end of said air inlet pipe in said combustion chamber, a series of jets in said gas pipe directed inwardly and toward the end of said air pipe, and valve means for said gas pipe adapted to be operated from above the floor.

5 In a gas heater for rooms and the like comprising a suitable casing a combustion chamber in said casing and means for introducing air into said combustion chamber from the exterior of said rooms, said combustion chamber having an outlet for all of the contents thereof into the rooms to be heated.

6. In a gas heater for rooms and the like, a suitable casing, a combustion chamber in said casing, a series of luminous gas burners in said combustion chamber, and means for passing a current of air from the exterior of the rooms.

Sanitary and Heating Engineers Platoon

A Direct Appeal to Those Engaged in the Trade, Both Employer and Journeyman — The Officers of the 9th Mississauga Horse, 170th Overseas Battalion, C.E.F., Are Endeavoring to Form a Sanitary and Heating Engineers Platoon, Enabling Men to be Pals in War as Well as in Peace

DOESN'T that sound like a good idea? It is the result of an afternoon's chat with several of the trade fraternity, during which the question of recruiting for overseas service was raised. It was suggested that a logical extension of the "pals' principle" would be found in grouping together in platoons men who have common interests in civilian life as for instance members of the same or allied trades.

Accordingly, it was decided to put the idea into practical effect and this article is written with the object of bringing the matter before the employers and journeymen of the trade. The Sanitary Engineer is strongly of the opinion that the proposition is one which should and will receive the support of the trade. It has indeed already received the hearty endorsation of several of the prominent firms in Toronto, and has met with a gratifying reception by the officers of the journeymen's local 46. The matter will also be brought before the next meeting of the Ontario Society of Domestic and Sanitary Heating Engineers, where it is practically certain of hearty support.

ROBERT GRANT HENDERSON
A born soldier and a sanitary engineer

The idea of platoon recruiting as outlined above, had its origin, to some extent, in the fact that one of the officers of the 170th Battalion is Mr. G. A. Keith of the firm of Keith's, Limited, Toronto, and accordingly this unit is interesting itself in the plan and is extending to the men of the trade a hearty invitation to come along. It is proposed with the co-operation of the association and the executive of the local union to make a thorough canvass of the men of the trade with the object of extending an invitation either by letter or by personal interview to every member to enlist with the 170th Battalion. It is proper to note at this point that the recruiting methods employed by he 170th Battalion will cause neither annoyance or embarrassment to any man. A straight invitation to come along and a clear explanation of the proposition is the method adopted. The 170th takes the view that the matter of overseas service is one that is strictly up to the individual himself, and that each man knows best what his duty is. Consequently there is no demand made and no reflections cast if a man doesn't elect to sign up.

LT.-COL. LE GRAND REED

This battalion under the command of Lt.-Col. LeGrand Reed is just commencing its recruiting campaign. It promises to be one of the best organized units turned out to date, and among other advantages offers to the men in its ranks the assurance of able leadership. Col. Reed, himself, is particularly identified with recruiting in this division, being responsible for the splendid organization of the Toronto Recruiting Depot, of which he had full charge up to the time of his appointment for overseas service. He has gathered around him a staff remarkable for experience and ability. Among the officers are Major Morris, late A.D.C. to General Logie; Major McCarthy, who has just returned from 18 months in the trenches with the Royal Canadian Dragoons; Captain Myles, who has had six years' experience with the Imperial forces in India, and wears a South African ribbon; Captain Moss-

MAJOR McCARTHY
Just returned from the trenches after 18 *months' service*

man just returned from service in Servia. Col. Reed has throughout selected his officers from men of mature age and accustomed to responsibility, every man being fully qualified for his work before receiving appointment. Accordingly, the men of the 170th will not find themselves under the command of a lot of "kid officers just out of school."

It is perhaps not necessary to mention the advantages of platoon organization along the lines indicated, or to point out why the men of the trade should lend their assistance to the plan. Under this arrangement the boys will be assured of congenial company, and will be associated with men with many of whom they will be personally acquainted and certainly all of whom will have common interests. It is to be noted also that when these men go overseas friends and relatives at home will have a far better assurance of "keeping touch" than they would if the boys were enlisted promiscuously into units where acquaintances possibly would be few and far between. Letters home from this platoon in which every man will probably have mutual acquaintances will constitute a very efficient information service concerning all the men in it.

Accordingly the masters and journeymen of the trade are requested to lend their best co-operation to the furtherance of this plan. Suggestions from any one interested with regard to recruiting methods, we are assured, will be welcomed by the officers of the 170th Battalion.

The recruiting headquarters of the unit are at the Armories, Toronto. Communications may also be addressed to

Mr. Storey, Business Agent, Local 46, Labor Temple, Toronto.

Mr. G. F. Frankland, 1093 Bathurst street, Toronto.

Mr. E. Newsome, Editor Sanitary Engineer, The MacLean Publishing Co., Toronto.

DOING HIS BIT

Robert Grant Henderson, Esq. Born in Edinburgh, Scotland, 1869. Joined the 48th Highlanders 24th March, 1892, as a private, when that regiment was first formed, has had continuous service in the Highlanders ever since, being raised in rank up to sergeant-major.

He has now joined the 170th Highlanders Battalion C.E.F., as battalion Sergt.-major. This being the third full battalion raised by the 48th Highlanders, as well as four extra companies raised for other battalions. He comes of a soldier family, three brothers now being engaged at the front, one of whom belongs to the Border Regiment, that was engaged on the Gallipoli Peninsula.

Robert was injured in a wreck several years ago when the Highlanders were returning from a sham fight at Cooksville on Thanksgiving Day, another train colliding with that in which the Highlanders were, so that he has had his introduction to what they hand out in Flanders, etc.

Robert as well as being one of the first volunteers of the 48th Highlanders, is one of the old guard of the Toronto Society of Domestic Sanitary and Heating Engineers, having been engaged in the plumbing business in Toronto for the last twenty years.

Mr. Henderson leaves a wife and family of three boys and two girls behind him. The oldest boy Albert, who has been associated with his father in the business, will look after the business in his father's absence. Albert was injured in the wreck mentioned above, and still suffers from a weak ankle which was broken at that time.

Here's hoping that Sergeant Major R. G. Henderson returns to us safe and sound with all the glories that do abound from being a member of that glorious old regiment the 48th Highlanders, which is allied with the Gordons.

POSSIBILITIES OF THE DREAMER

(Continued from page 11.)

What did Edison do when a thousand and one scientists declared that an electric car of commercial value and usefulness could never be made?

Let's get a little nearer to the things in our line. What did all those men who have invented steam specialties say when told by the old-time steam engineer that "to heat by steam you must create pressure?" They simply said WHY?

Why can't I get the hot vapor, found in the top of a tea kettle before steam is actually generated, into a radiator? These men found out the WHY. They have done it. It's as common as can be now to see a building heated without pressure.

Here's another; How many are there who would ever dream that it is possible to heat 324 square feet of hot water radiation through a one-inch pipe?

Yet this is being done, no "can't-be-done" about it.

In fact the writer can give an instance where 324 square feet of h.w. radiation was actually heated satisfactorily through a ¾ inch pipe.

Now, the point is when one feels in themselves that "It-can't-be-done," whatever that "It" may be, to ask one's self WHY? and not only ask, but find out. We cannot conceive a more appropriate sign to hang up in one's place of business, office or home, than such a one as is shown below. It should spur a few of those who belong to the "can't-be-done" class up a little.

There is a good story told of a professor who, when told by one of his students that a certain thing could not be done, replied, "Well, boy, I don't see how it can be done, you evidently don't see how it can be done, but neither of us are thoroughly satisfied about the matter.

One thing I do know is, that while you and I are saying "It can't be done, some damned simp on the street will go and do it."

It is all a case of asking ourselves "why?" and if we ask hard enough, and persist in the asking we shall in the end succeed.

The idea is:

Why can't our business be improved?

Why do we not look up work?

Why are thousands of tons of coal being wasted?

Why are our homes little better than incubators of death?

Why do we breed tuberculosis, pneumonia and typhoid?

Because we

Are indifferent to the fact that we can cure these ills.

We say it can't be done.

We are sure that our homes do not deserve the name of sanitary homes.

We know that 50 per cent. of our coal is wasted.

We are not advocating up-to-date methods for controlling our temperature.

We believe that humidity is necessary but do not try to improve matters.

And finally

Because we need to find out why we are content to be "can't-be-done's." rather than become

THE VALUE OF A SMILE

The thing that goes the farthest
Towards making life worth while,
That costs the least and does the most,
Is just a pleasant smile.
The smile that bubbles from a heart
That loves its fellow-men,
Will drive away the cloud of gloom
And coax the sun again.
It's full of worth and goodness, too,
With manly kindness blent;
It's worth a million dollars,
And doesn't cost a cent.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

HEATING BY ELECTRICITY

Editor The Sanitary Engineer.

There is, I understand, some form of steam radiator which uses electricity to generate the steam. Could you give me some general idea as to how such an appliance operates?

Further, if a building was to be heated by electric heaters, what would the general layout of wiring be like?

Suppose a person had a gasoline engine and small electric dynamo, could electricity be generated and the electricity be utilized for heating?

I am aware that this is a subject a little out of your line, though it is a matter which would come under heating, and no doubt with the advent of cheap electric current the question of heating buildings by electricity will at some future date be popular.

Sask. ELECTRIC HEAT.

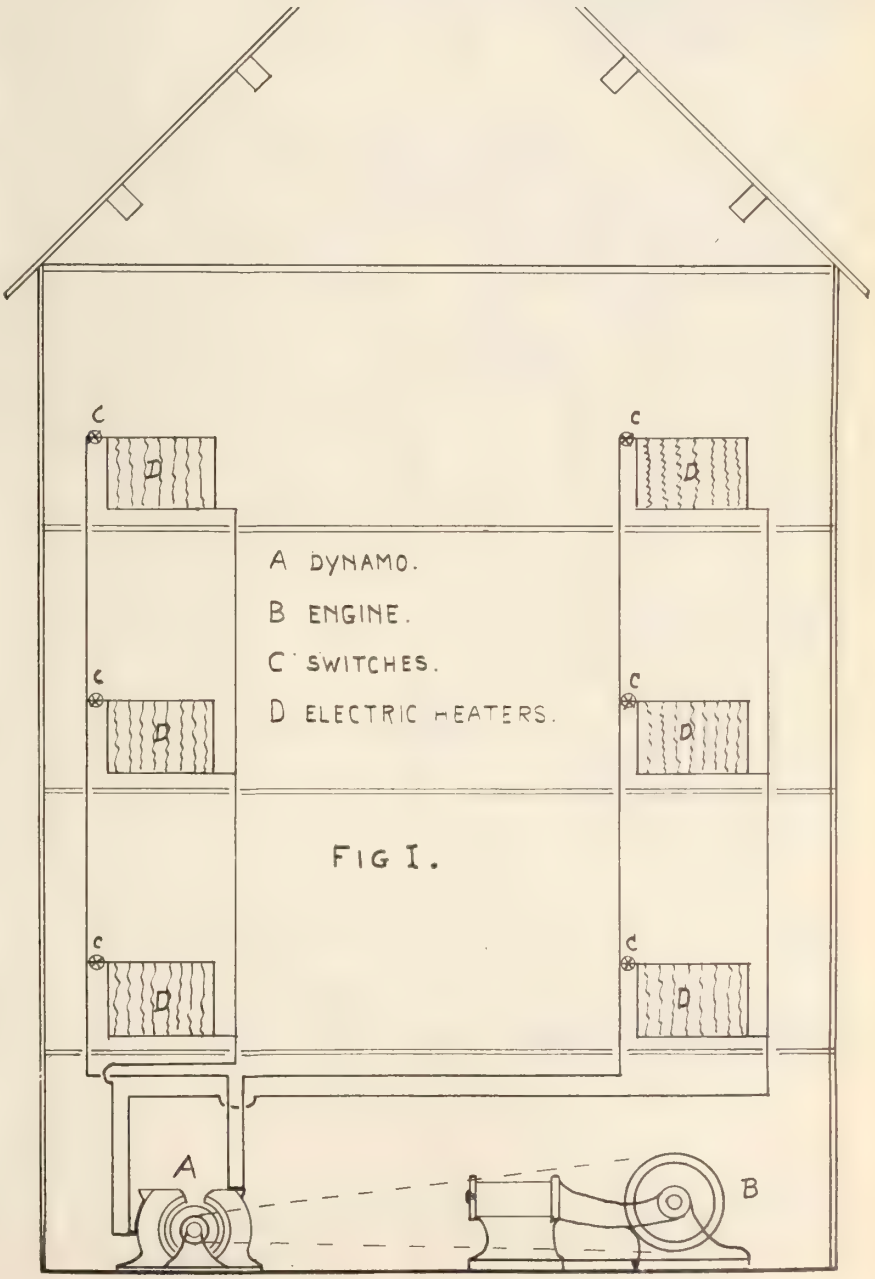
With reference to the first question re electric steam radiators, two such radiators were described in the September 15 issue, page 34, and also on page 29 in November 1st issue of last year.

The general principles upon which such radiators work are as follows:

Certain heating filaments are inserted into an ordinary radiator, which contains a given amount of water. This water is turned into steam by the electric heating properties thus inserted. Generally speaking, one cubic inch of water will evaporate into a cubic foot of steam at atmospheric pressure; therefore, if a certain number of inches of water be placed in an electrically-heated receptacle and raised into a certain cubic area of steam there would be no danger of explosion. These electric steam radiators are also automatically controlled.

When a certain heat of steam has been generated the current is automatically cut off.

Figs. 1 and 2 show the two radiators

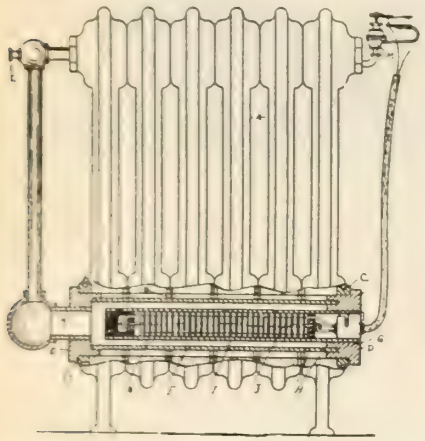


General layout of electrically heated house. Engine and generator situated in basement.

mentioned in prior issues of The Sanitary Engineer.

Fig. 3 shows the general principle. A represents a dynamo, which may be run by any form of power; the wiring, it will be seen, is very similar to a two-pipe steam or hot water system.

We have shown the wiring separate, though it could be run together if properly insulated. There is almost the

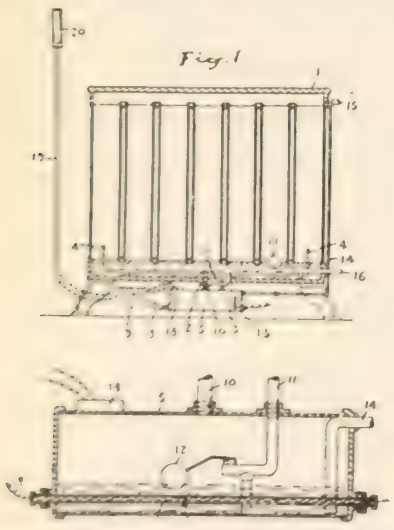


Another form of electric steam radiator automatically controlled.

same principle involved in wiring for electric heating as steam or hot water heating. Care has to be exercised that different heaters do not short circuit each other.

It is also very essential to bear in mind that wires are sufficiently large and well insulated to carry the amount of current.

For instance, suppose a heater is installed which takes up more current than the wires are able to carry, these



Automatically controlled Electric Steam Radiator

wires will become hot, and are liable to burn the insulation off, thus setting fire to the building in which they are placed.

The same applies when wiring a house for lighting. Thousands of houses have been burned down because of this very thing. Small wires, poorly insulated wires, and poorly made connections are just as dangerous.

Many of those sanitary and heating engineers who sell any number of electric fixtures should make sure that their customers have sufficiently large wire in their houses to carry the necessary current required to operate the appliances sold to them. Of course, in many cases the fuses will take care of any overload and soon give warning of any danger by burning out.—Editor.

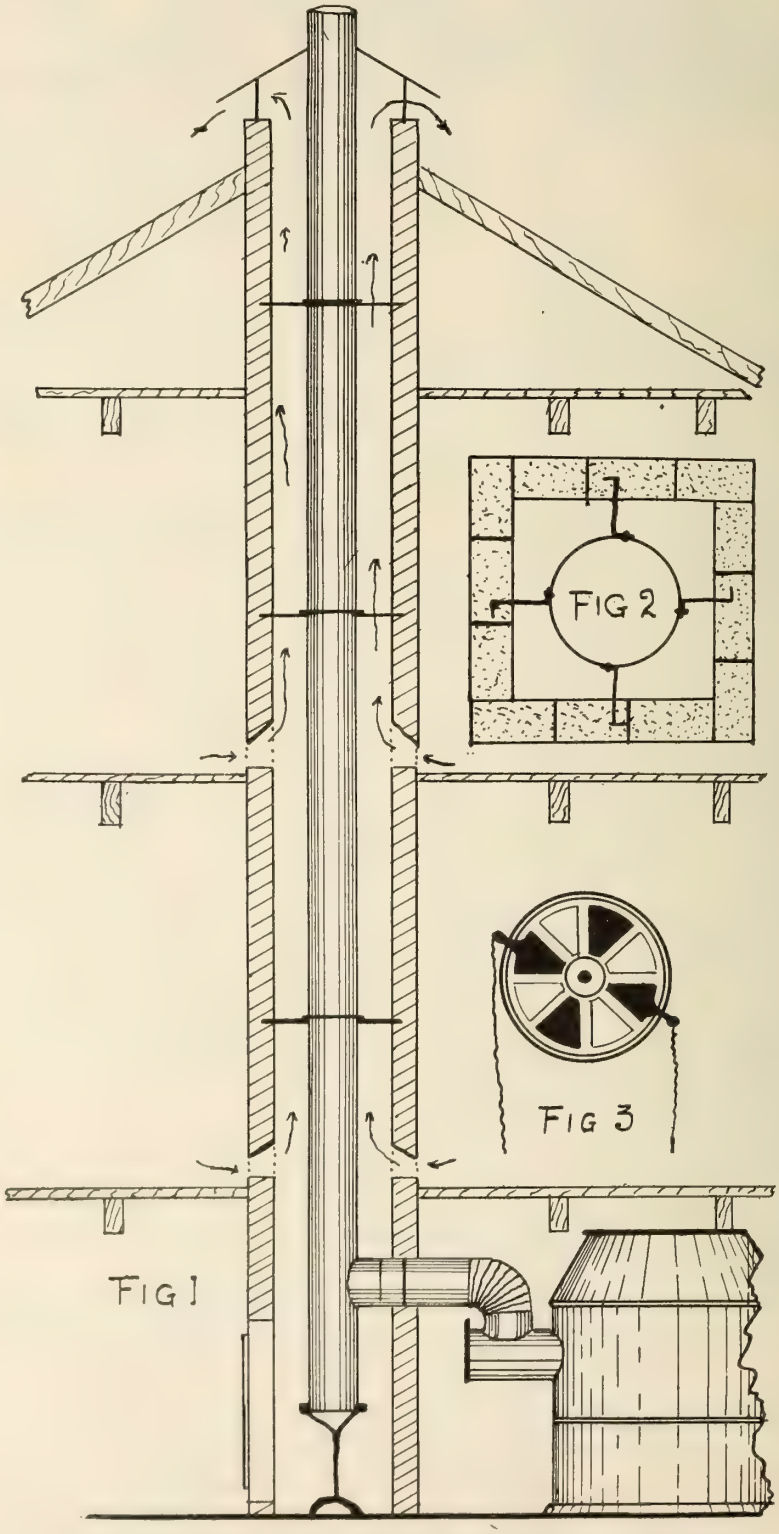
HEAT AND VENTILATE A COUNTRY SCHOOL

Editor The Sanitary Engineer.

I have been called upon to figure on heating a country school. The trustees have decided to put in a big warm air furnace, to burn either wood or coal.

It is only a four-room school, two up and two down, with hall, stairway and basement; the hall and stairway is on

(Continued on page 30)



Showing how a four-roomed country school could be cheaply ventilated, by using a centre shaft and running smoke stack through centre

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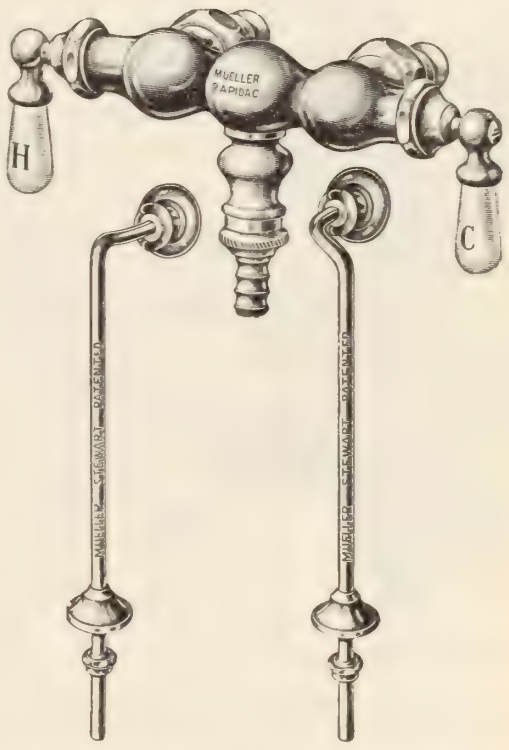

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one side, the rooms on the other.

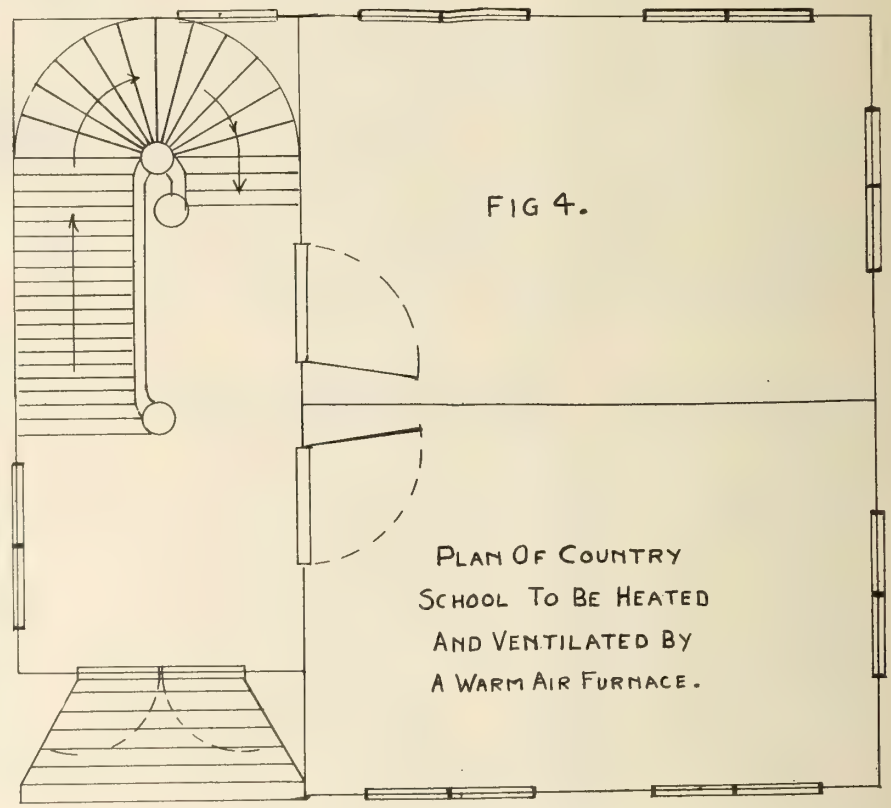
There is no provision for ventilating these rooms, and from what I'm told when these rooms were heated with stoves they became very stuffy. Each stove had a separate little chimney, with the pipes running through the upper rooms from the lower ones.

It occurred to me, seeing we have to build a new chimney, that it might be possible to ventilate these rooms if a shaft of some kind were built up at the same time as the chimney. I have sent you a rough sketch of the school; the top floors are exactly the same. Could you suggest some way in which ventilation could be provided at as low a cost as possible, also the best location for a furnace?

C. S. V., N.B.

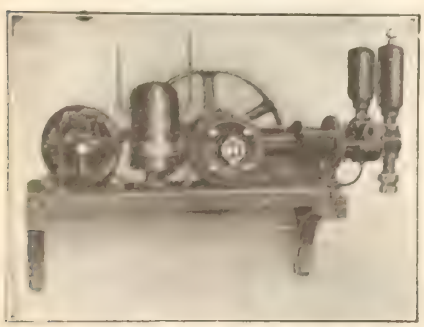
As our correspondent did not furnish us with size of rooms or furnace, etc., we have simply shown how these school rooms may very simply be ventilated. If a brick or even a cement shaft is built in the centre of one of the inner walls, as shown, then a steel smoke stack, or even a very heavy galvanized one may answer the purpose. This to be run up the centre shaft, as shown in Fig. 1, and well stayed with a large canopy top, allowing the chimney or smoke stack to project through the top. Then allow a sufficiently large opening at the top not less than twice the area of the space provided round the iron chimney in the stack. Then by placing louvred registers at the base boards in each room the heat from the smoke pipe will create a suction, and thus ventilate the rooms. This could also be improved by placing a round-faced register a little below the ceiling of each room, which could be opened and closed by a cord (see Fig. 3). Fig. 4 shows plan of school to be heated and ventilated.

We would advise the furnace being placed as near the centre of the basement as possible, which would result in it being near the stack described, as well as making it possible to construct all the warm and cold air pipes of equal lengths. One of the worst evils of warm air furnaces is that the warm air pipes are not sufficiently equal in length, thus causing some rooms to be warmer than others.—Editor.



This school could be well ventilated by adopting method suggested in Fig. 1.

The Paul Electric Motor Pump



[illegible] write to the Fort Wayne Engineering & Mfg. Co. (Dept. 8), Fort Wayne, [illegible] which describes this [illegible]

'TIS THE SET OF THE SAILS

"One ship drives East, another drives West,
While the self-same breezes blow;
'Tis the set of the sails, and not the gales
That bids them where to go.

"Like the winds of the sea are the ways of the Fates,
As we voyage along through life;
'Tis the set of the soul that decides the goal,
And not the storm or the strife."

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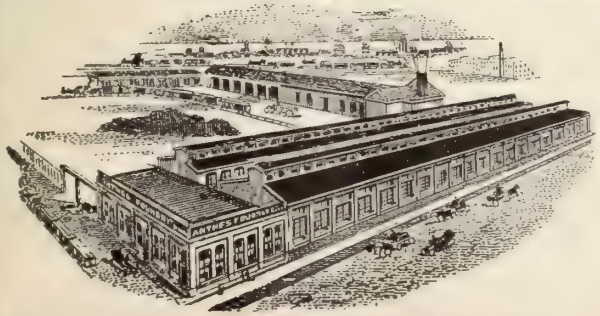

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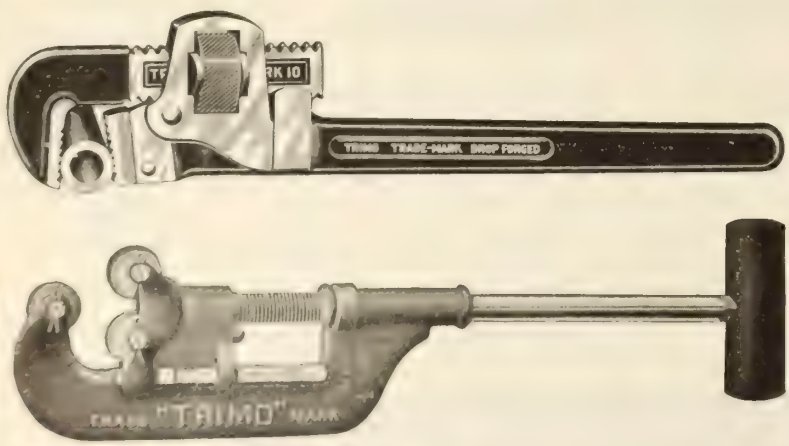

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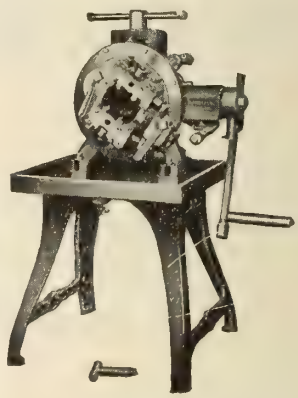

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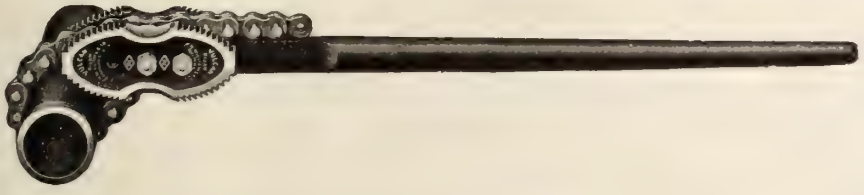

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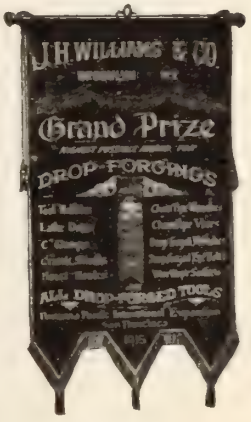

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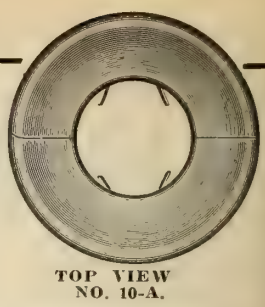
The CEILING PLATE that's better



TOP VIEW NO. 10-A.

THE NO. 10—A NARROW FLANGE PLATE IS A STEEL HINGED PLATE. FLANGES ¾" WIDE. HIGHLY FINISHED. ESPECIALLY DESIGNED FOR IRON CONNECTION.

The split ceiling plate is coming more and more into use than ever and ALWAYS GIVES A NICE FINISH, because it can be attached to mains and users at the very last, and is not exposed during completion of a building.

High quality at the right price.

Gem No. 4.

Gem No. 4 Automatic Air Valve

Made from the best brass obtainable. Pressed shell and pressed brass base which eliminate danger from blowholes, which is a fault with cast bases.

Write for catalog showing our complete line of specialties.

The BEATON & CADWELL MANUFACTURING Co.

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Consulting Sanitary Engineer

Advice and Plans on

Water Supply and Sewage Disposal for Residences, Factories, etc.

H. L. SEYMOUR, B. A. Sc.,
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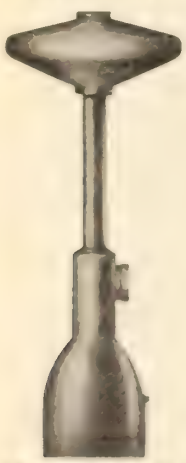


The Honeywell Heat Generator—the only perfectly safe device for sealing a hot water system. No springs, weights, valves or movable parts—nothing but two open tubes joined at the bottom through which mercury and water circulates.

Dependable

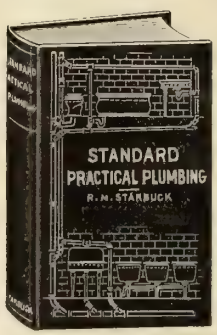
It is absolutely impossible to stick or create more than ten pounds pressure in the Honeywell Generator. It gives perfect satisfaction under all conditions and can be used for either old or new work.

Write for booklet "How to Properly Design and Install the Honeywell Method of Hot Water Heating." It is free.

HONEYWELL HEATING SPECIALTY CO.

Wabash, Indiana

Manufacturers of High-Grade Heating Specialties



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By R. M. Starbuck

347 SPECIALLY MADE ILLUSTRATIONS

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"Standard Practical Plumbing" is indispensable to the Master Plumber, the Journeyman Plumber, and the Apprentice Plumber. As the book is specially strong in the exhaustive treatment of the skilled work of the plumber, it commends itself at once to every one working in any branch of the plumbing trade. Send for it to-day.

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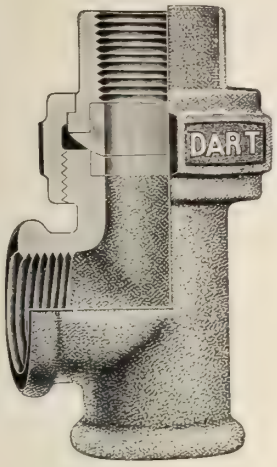
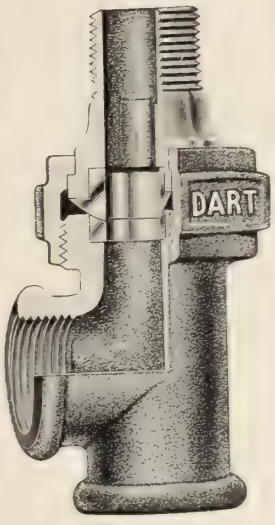


Combined T, Union and Nipple



Combination of T, Union and 2 Nipples

DART

A wonderfully big saving of time, neater work and a positively tight and satisfactory connection is the result of using these styles of

Dart Unions

The Dart Union never requires readjustment. It stays tight because the Bronze to Bronze faces never rust or corrode, and the heavy iron parts withstand all stress.

The Ball-shaped Joint enables you to make the connection easily and quickly, whether pipes are in or out of line.

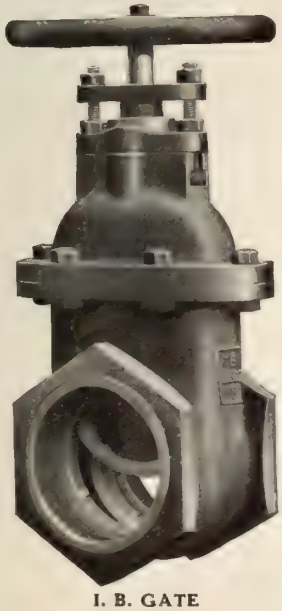
The Dart is backed by a long successful record, and is fully guaranteed.

Sold by all jobbers.

MANUFACTURED BY

DART UNION CO., Ltd., Toronto, Can.

KERR GATE VALVES



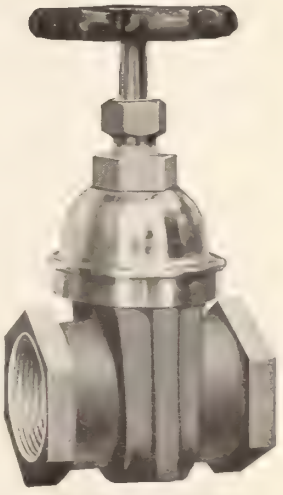
I. B. GATE

These Iron Body Gate Valves were designed and are made by US to meet YOUR demand for strong, substantial, interchangeable valves, with "nobby" appearance.

They meet the requirement and more. When they get us a customer they hold him.

Who in the Steamfitting trade has not heard of and used Kerr's (Weber) Brass Gate Valves? We say "Kerr's"—not the imitations. We make this valve of uniform material, and they stand up to the work given them, just as they always have. Some have tried others, but they came back to the tried and trusty old "Weber Gate" made by Kerr What is a few cents on a valve, when you can get one like the genuine "Weber"?

Have you our Catalogue No. 5?
If not, we will mail you one
A postal to-day will bring it.



BRASS GATE

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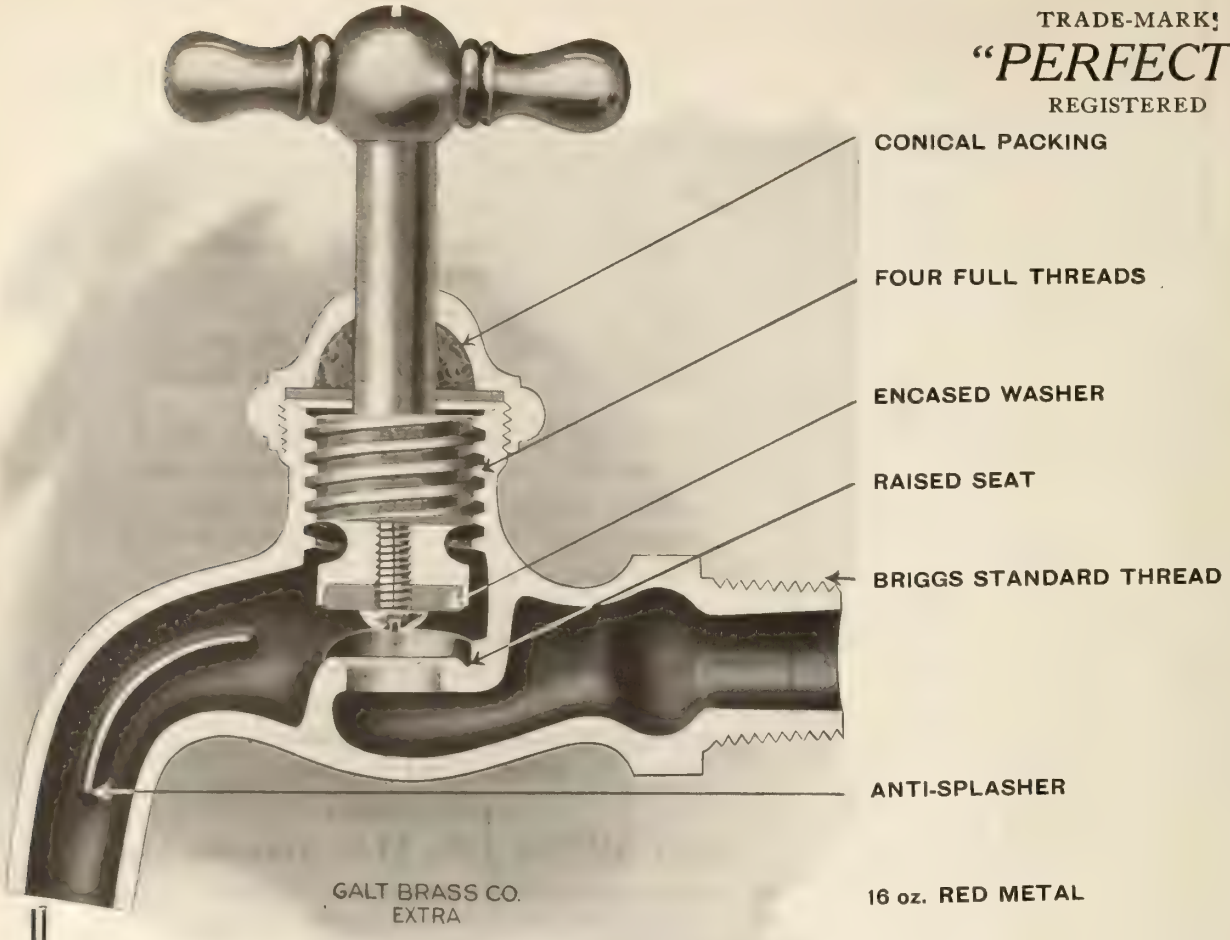
WALKERVILLE, ONTARIO

TRADE-MARK!
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER

PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol X. Publication Office: TORONTO, MARCH 1, 1916 No. 5

FILE COPY

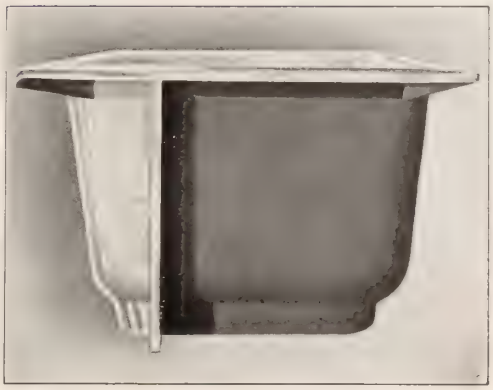
Enameled All-over

VICTOR ONE-PIECE BATH

Enameled Inside

FILE COPY

The principle of the Victor Bath is a tub body cast integral with a Base and Wing Plates: the latter in various positions on the Tub Body to make the various Combinations, viz.:



Open Type
Corner Type
Recess Type
End to Wall Type
Back to Wall Type
Also with Extension Rim at End or Back for fittings—thru rim.

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Beaver Brand
Cast Iron Enameled Ware

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Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability

Ask your jobber for BEAVER BRAND CAST IRON ENAMEL WARE and build up your reputation

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28 "Service" Branches throughout Canada

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Best Quality
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Best Workmanship

In our Rubber Goods, it is QUALITY that counts. We stand back of the quality, workmanship and construction of our lines. That protects your interests, and you are sure to be satisfied.

Our line-up is complete, our quality is unexcelled, and our prices are right. Let us show you what we can do.

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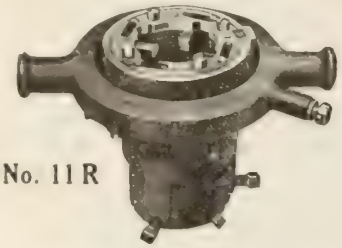
28 "Service" Branches throughout Canada

"Jardine" and "Toledo" Pipe-Threading Tools

Reduce the labor of pipe threading 50 per cent. and make threads as clean and perfect as if cut on a Lathe with only ONE cut.



No. 11 R

"Jardine" Adjustable Ratchet-Threading Tool

Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely enclosed, excluding chips and dirt.

"Jardine" or "Toledo" dies spare the muscle of the man who does the work, and save money for the man who pays the wages, as they enable one man to do the work of two and cost less for repairs. No cams or jimcracks to wear and get out of order. Cutters that cut, don't squeeze. Set of cutters for each size of pipe. Lead screw ensures perfect pitch and form of threads. Adjustable to all variations of fittings, very durable cutters.

IS NOT A TOOL LIKE THIS WORTH YOUR CLOSEST INVESTIGATION?

We'll be pleased to put you in touch with users and send catalog. Write!

All threads finished at one cut. One man does the work of two.

MADE IN CANADA

A. B. JARDINE & CO.

HESPELER, ONT.

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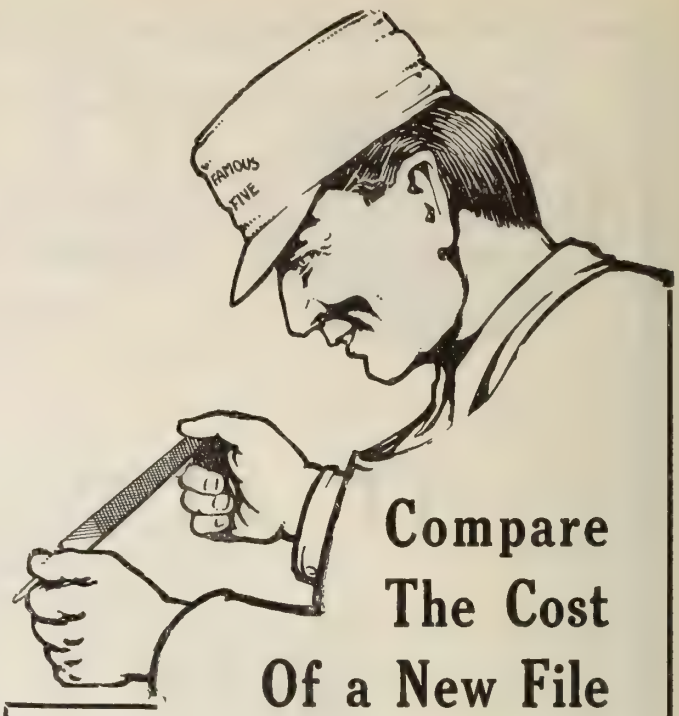
[illegible] Winnipeg and West—Stanley Brock, Ltd., Winnipeg, Man.

Brockville and East:—J. R. Devereux, 233 St. James St., Montreal.



Compare The Cost Of a New File

with the time your men are wasting using a file when it is half worn.

It won't take long for you to figure out that the cost of a new file is negligible in comparison to the time saved in labor.

Teach your men to throw away their files when they are half worn, and replace them with the files favored by 90% of Canada's file users.

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

(Made in Canada)

They are the product of 50 years' experience in file-making, and are as uniform as the most scientific knowledge and up-to-date machinery can make them.

Sufficient indication of their popularity is a yearly output of 60,000,000 files.

Your FREE copy of "File Filosophy" is waiting for you. Just drop us a card.

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Port Hope *(Dealers Everywhere)* **Ontario**

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Always gives satisfaction.

EASY TO REGULATE
EASY TO CLEAN

WARDEN KING, LIMITED
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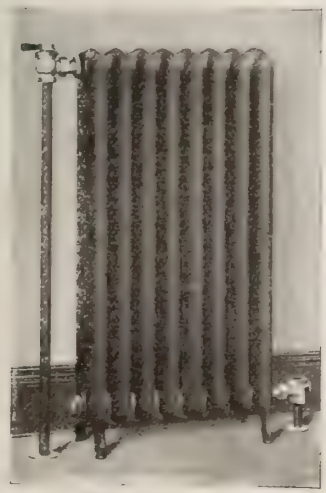
Mr. Sanitary Engineer:—

Sometime—some day, possibly sooner than you imagine—a prospective customer is going to ask you: "What about a '**DUNHAM VAPOR SYSTEM of Heating**' for this job?"

It is going to be mighty profitable for you to be able to tell him just why the DUNHAM SYSTEM will give him: **more comfort, more heating satisfaction** and **more economy** than any other heating.

A good thing cannot be kept away from people who are looking for the best.

The DUNHAM SYSTEM is getting its full share of recognition as the best in Residence, Store or Apartment Heating.



"The Dunham Way"

Many contractors and owners are enthusiastic over Dunham Systems they installed.

Getting the hang of figuring and installing a Dunham System is just as simple as the operation of the System itself.

If you are interested and have not already received them —ask for our Bulletin No. 11 and "Information Bulletin" on the DUNHAM Vapor SYSTEM.

C. A. DUNHAM COMPANY, LIMITED
TORONTO

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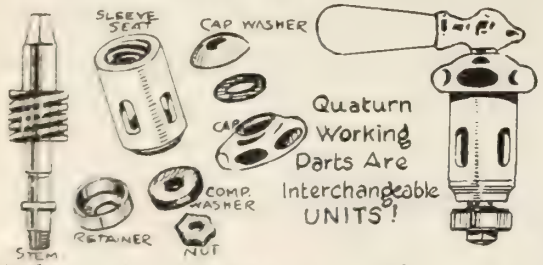
Just Compare The Celebrated SYDENHAM BRAND Quaturn

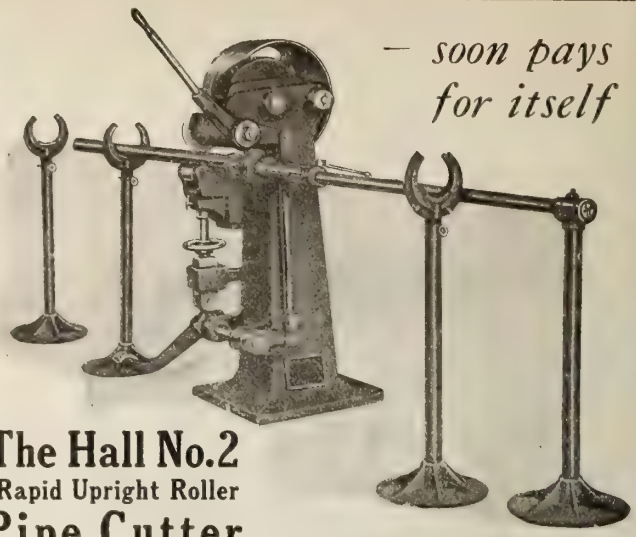
"OPENS WITH A QUARTER TURN CLOSES WITH THE PRESSURE"



What Other Faucet Has Removable Seat And Interchangeable Working Parts? Send For a Trial Pair: Test Them For Yourself.

WALLACEBURG BRASS & IRON MFG. CO. LTD.

WALLACEBURG, ONT.



— *soon pays for itself*

The Hall No. 2 Rapid Upright Roller Pipe Cutter

MADE IN CANADA

Regular capacity ½ in. to 2 in., with extra cage will take ⅛ to ⅜ in. pipes. Cuts from 400 to 500 pieces of 1 in. pipe per hour.

IN A MEDIUM-SIZED SHOP IT WILL SAVE ENOUGH TIME AND PIPE TO EASILY **PAY FOR ITSELF IN LESS THAN TWO YEARS**, AND AFTER IT IS PAID FOR THE SAVINGS GO TO MAKE LARGER PROFIT.

WEIGHT, 700 LBS.

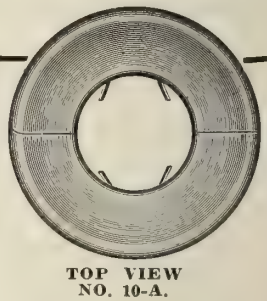
INVESTIGATE THOROUGHLY—**send for catalog and prices on all sizes, and let us put you in touch with users so that you will know how Hall machines are pleasing others.**

Delivery from stock. No delay.

JOHN H. HALL & SONS, Limited
BRANTFORD, CANADA

OPEN VIEW NO. 10-A.

The CEILING PLATE that's better



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The split ceiling plate is coming more and more into use than ever and ALWAYS GIVES A NICE FINISH, because it can be attached to mains and users at the very last, and is not exposed during completion of a building.

High quality at the right price.

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Made from the best brass obtainable. Pressed shell and pressed brass base which eliminate danger from blowholes, which is a fault with cast bases.

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FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

ROYAL PALACE OF LA MAGDALENA
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COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

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OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ENGLAND, LONDON

PALACE OF THE KING OF THE BELGIANS
BRUSSELS

Modern Advance Demands
TUEC Service

(MADE IN CANADA)

The telephone, which but a few years ago was called a luxury, is to-day installed in every business office and most every home. The time is not far distant when the **Tuec Stationary Cleaner** will be installed wherever cleanliness is considered worth while. Who is the logical one to make these sales and installations? None other than the plumber. Now is the time for you to step in, Mr. Plumber, and grasp this business before other enterprising merchants do it. Let us tell you about our co-operation plans.

Write to-day.

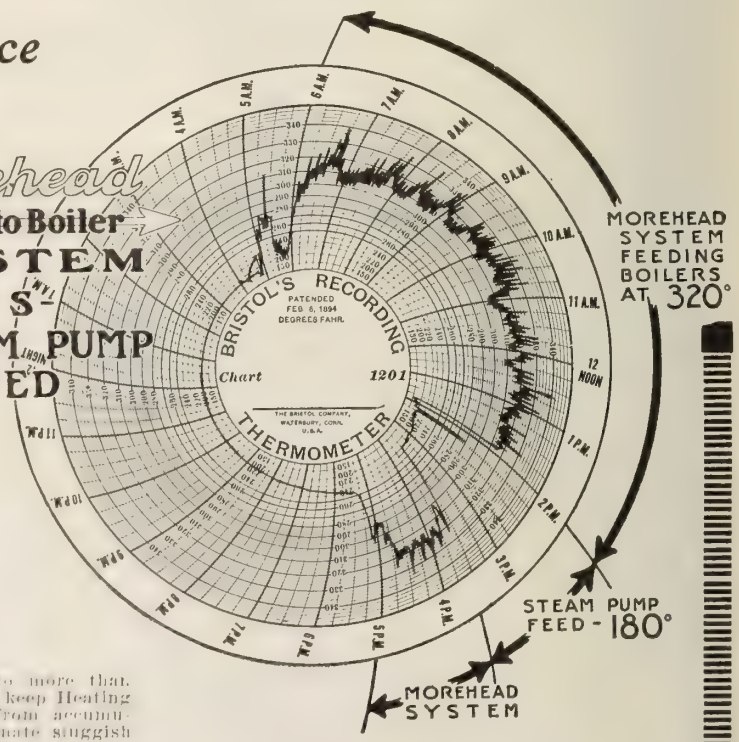
THE UNITED ELECTRIC COMPANY

159 Richmond Street West, Toronto, Ontario

TUEC RECEIVED GRAND PRIZE AT PANAMA-PACIFIC EXPOSITION

—the value of the Difference graphically shown

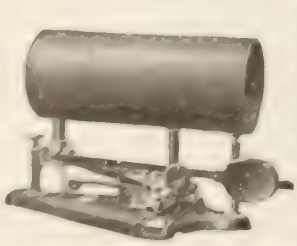
Morehead Back to Boiler SYSTEM -VS- STEAM PUMP FEED



TO ENGINEER ARTHUR A. RICE, of the Hoyt Wholesale Grocery Co., of Chicago, we are indebted for the accompanying chart, taken under every-day working conditions.

Just think of the value and satisfaction to your client of a heating system when the condensation is instantly removed and returned to the boiler, or feed water at the extreme high temperature shown on this chart. Compare the Morehead temperature with the Pump Return temperature—then get out your pencil and figure the saving in fuel, time and water.

Eliminates Accumulated Condensation in Your Steam Lines.



The "Morehead" System will do more than reduce boiler room costs—it will keep Heating Equipment, etc., entirely free from accumulated condensation—it will eliminate sluggish circulation, forever.

For authentic data on the results others are getting with the "Morehead" System simply write for the "Morehead" book.

Write for the "Morehead" Book — a Volume of Steam Drainage Facts.

Canadian Morehead Mfg. Company

Dept. "C," Woodstock, Ontario

347

THE Aylmer 520 HAND PUMP PRESSURE SYSTEM

THE STANDARD OF CANADA

Can be installed in less time than any other

The New Base does away with the necessity of fastening pump to floor. Also provides ventilation for base of tank, permitting condensation to get away, thus eliminating cause of rust.

Better Prices

Write to-day for Price List No. 18.

Figure H. 520. Aylmer Standard System with Adjustable Base for Tank and Pump.

PUMP WITH INDEPENDENT AIR COMPRESSOR

Made in Canada.

AYLMER PUMP & SCALE CO., Limited

AYLMER, ONTARIO

Wolverine Tank Balls

—Guaranteed—

The ball with the reinforced top which makes elongation impossible.

Made of the finest rubber and will outwear three ordinary tank balls.

Our full line of Quality Rubber Goods are at your command, and if you want to give satisfaction all the time, use only Wolverine goods.

Canadian Wolverine Company
Limited
CHATHAM, ONT.

Like the onward march of the glacier, the force of example is irresistible, but infinitely slow. Advertising, however, is like the snowstorm that covers the country in a single night—but don't forget that if you want to keep the country covered you have got to keep the snow falling or the heat of competition will melt it.

Mr. "Licensed" Plumber

Bulletin No. 11

An important departure from the old order of things—has just been announced (by mail) to the Licensed Plumbers of Toronto.

Every Licensed Plumber should take full advantage of this new proposition — it means real money in their pockets.

Full information can be had on request.

The Consumers' Gas Co. of Toronto

12-14 Adelaide St. W. **Phone Ade. 2180**

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The Heating Engineer

who installs a

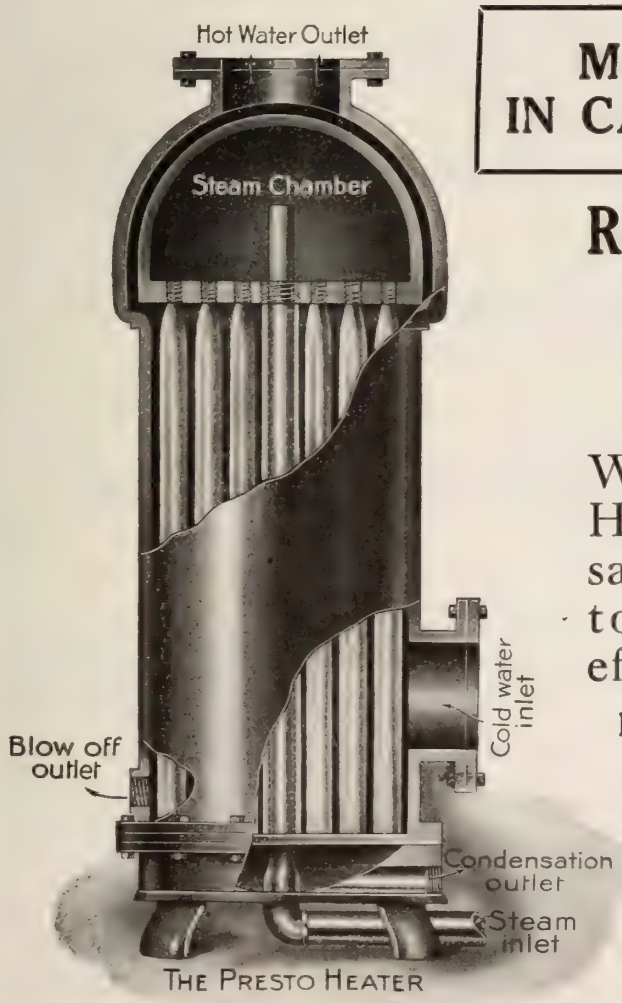
Presto Heater

does not run any risk.

We guarantee every heater to give entire satisfaction to all parties concerned.

Do you not think that it would be good business on your part to investigate the most economical heater on the market.

MADE IN CANADA



Remember our guarantee:—

The Presto Heater will show a saving of 25% over any other heater in the market.

We have yet to hear of a Presto Heater that is not giving entire satisfaction. Every owner is willing to testify as to the economy effected.

Let us send you our booklet, telling what actual owners say about the Presto.

Harris Heating & Engineering Co., Limited

120 Sanguinet St., Montreal

SANITARY ENGINEER
PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, MARCH 1, 1916 No. 5

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¶ The size of your business depends upon the satisfaction you give your customers.

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No Trouble
Closet Tanks

will enable you to give the utmost in tank satisfaction, because there are no linings to leak, no joints to open up — nothing to get out of order. Their lasting qualities are decidedly superior to any other make of tank on the market.

The beautiful snow-white or varnish finishes and the unusually attractive lines present an appearance that is fascinating to prospective buyers.

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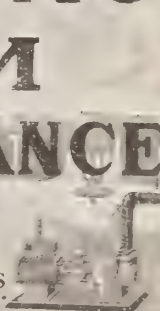

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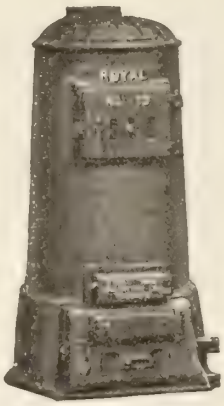

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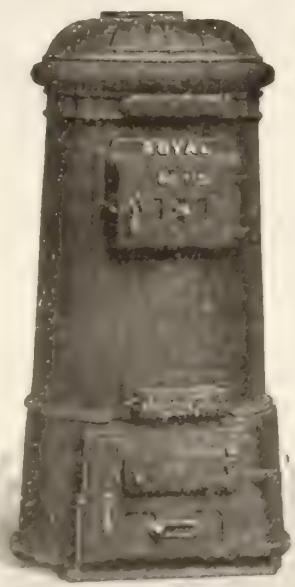

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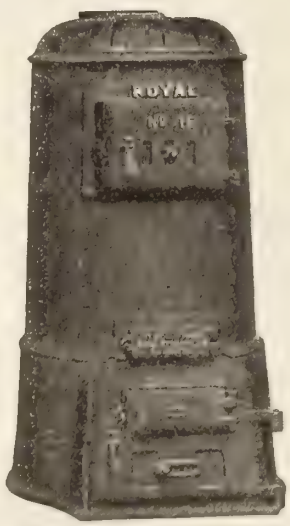

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THE SANITARY ENGINEER

VOL. X. MARCH 1, 1916 No. 5

Should an Architect Be Chosen as Expert Judge in Plumbing Construction?

Past Experience With Architects Proves That They Are Not Sufficiently Competent to Inspect Sanitary Engineering Construction — Toronto's Medical Health Officer Says Plumbing Should be Handled by an Architect —Not a Health Matter

IN the early part of the year 1914, the question of placing the plumbing inspection under the jurisdiction of the city architect's department was proposed in Toronto.

About that time a serious fire occurred in which several lives were lost. The investigation into this fire brought matters to light which did not reflect any great credit upon the then city architect or his staff.

In fact it was found that buildings all over the city were being erected in complete defiance of the building by-laws and the architect's department was found to be anything but competent to handle the building inspection department properly.

These revelations coming to light as they did gave a check to the proposition of placing the plumbing inspection under the jurisdiction of the city architect.

However, the canker work has taken on new life. and the proposal is again under consideration.

Ald Risk was appointed chairman of the Toronto Board of Health, and between the desire on part of Ald. Risk to reduce the running expenses of this board, the medical health officer's desire to shirk a responsibility and a hankering on the part of the city architect to become the Kaiser of the building trade, the proposed change is brought before the council again.

The worst feature about the proposal is that not one of these gentlemen knows for certain that any improvement can be made in the inspection department. Neither can either of the parties prove that a real saving of money can be effected.

One thing is certain, however, and that is that if Ald. Risk knew anything about the matter, he would not have placed such a proposal before council.

Secondly, the city architect, were he honest in the matter of this, would have frankly and fearlessly voiced an objection to such a step being taken.

The Sanitary Engineer would be the last to believe that our city architect himself would be satisfied to accept a report from an ordinary building inspector appertaining to plumbing construction.

The writer knows from actual experience that an architect is about the last man capable of judging whether a fixture is or is not properly installed, particularly now-a-days, when sanitary fixtures require more skill to install them and understand them than ever before.

In days gone by a man was termed a plumber if he could wipe the joint of a lead water or waste pipe, make leaded windows, turn lead joints, etc. It was all lead. Today these are minor matters. The wiped joint is almost out of existence and ere long these joints will be a thing of the past. as also will lead burning; leaded windows belong to another class of craftsmen altogether.

The science of metals in general has to be studied and plays an important part. So do the laws of hydraulics, expansion and contraction.

Ventilation is something to which the architect should have given prominence when drafting up plans for a building, but he seldom, if ever, considers this question at all.

He's an architect and that's all, and for him or a department under his control to assume the responsibility of the inspection of plumbing and sanitary engineering is little short of ridiculous.

The fact of the matter is instead of architects in general being artists in architecture, they are becoming the very reverse.

There would be far greater chances of a sanitary engineer becoming a fairly good designer of buildings than an architect ever becoming a skilled mechanic. Therefore, why allow a department or its head to have charge of something he knows little about.

But apart from all these facts there still remains another reason why the Board of Health should rule the plumbing inspection.

The health department of a city, town or village is all power, it is free from petty interference, and not subject to being tampered with by every person who desires a position or favor from individual council men or controllers.

While in the case of other departments almost anything can be secured by way of favors or concessions. In Toronto alone the building by-law is liable to be broken time and again, which is not the case with the plumbing inspection.

This latter statement does not, however imply that Toronto has by any means a perfect plumbing by-law, as far as it lays in the power of the present management, however, we have just reasons to assert that the by-law is carried out.

If there is need for a saving to be effected it should be done by creating an engineering branch of the health department.

The medical branch could attend to matters of physical health and matters requiring the attention of medical men. The engineering could be handled by sanitary engineers. Why not?

But of course, the main point which seems to loom up before Ald. Risk is to cut down the upkeep of the health department simply because he is chairman of the Board of Health.

It does not concern him one rap if it cost the architect's department $50,000 more. Much less does he care whether

the citizens pay more out of their own pockets in the long run.

All that Ald. Risk desires is to be able to say "I saved the citizens of Toronto $15,000 because I cut down the running expenses of the health department."

If a separate branch were created to take charge of all plumbing installations, and all drains from the main sewer into the buildings, and if power given to this branch to keep the plumbing by-law up-to-date; if annual inspection of all plumbing were brought into force, there is no question but that the direct cost of plumbing installations to the citizens of Toronto could be decreased at least 10 per cent.

For instance there is one part of the year when because of building operations new work must be inspected, then during winter or several months of the year building operations are almost at a standstill.

At this period the plumbing inspectors could be given a district each and could inspect all plumbing.

When the first inspection was made, a report should be filed and a card system installed, and if during the period between one inspection and another any alterations, additions or improvements had been made, the particulars should be noted on the card on file.

When the next inspection is made the inspector would be able to see if any repairs or alterations had been made and whether or not the work had been done in accordance with the plumbing by-law, or at least done in accordance with good practice.

There are lots of men in almost every city, engaged in making repairs, that are not properly executed. Hardwaremen, tinsmiths, handy machinists, etc., are busy making thousands of repairs which are not properly done.

Lavatories and sinks are installed with blind vents, and in scores of cases whole bathroom outfits are connected up to poor piping—piping and traps, which in the first place were installed by "handy men."

All this is going on and the public thinks it is getting good work done, which is not the case by any means.

But all these things are beyond the grasp of such men as are these days elected to our council chambers.

So long as the cost of running their particular departments can be reduced, it matters not whether true economy has been effected. The fact is that in the case of Toronto, Ald. Risk may think that by effecting a saving of $15,000, he is practising true economy, though at the same time because of incompetent men being called upon to inspect work they know very little about, the public will without doubt pay half a million dollars more for it than they should.

Architects as a whole are not and never can be competent men to inspect sanitary engineering constructions. This is proved by the fact that 99 per cent. of the plumbing specifications drawn up by architects for buildings erected are incomplete. They are all drawn up from pure assumption, just as the inspection of plumbing will be if placed under the jurisdiction of the architect's department.

SANITARY INSPECTORS HEAR AN ADDRESS ON LIGHT

A provincial meeting of the Sanitary Inspectors' Association of Western Canada was held recently in Regina, following the examinations held during the day by the Sanitary Institute of Great Britain.

Thomas Watson occupied the chair for the meeting and opened the proceedings by introducing Mr. Tustin, of Winnipeg. Mr. Tustin spoke of the honor done to the Province of Saskatchewan, and the advantages that would accrue from the appointment of a permanent examination board for sanitary engineers.

The feature of the meeting was an address by Dr. W. W. Andrews, who took for his subject: "Light." The doctor held his audience spellbound for over an hour while the higher scientific wonders of light were brought into review. He made all his points apply to the work which had to be done by engineers in sanitary inspection and among other things spoke of a necessity to limit the height of buildings, while maintaining adequate width of streets. Vibrations, refraction, color, the spectrum from ultra red, the ultra violet, heating and chemical action, were all graphically and succintly illustrated.

At the conclusion of the address a vote of thanks was passed to Dr. Andrews and congratulatory speeches made relative to the Regina Association for the excellent educative work it has accomplished.

BOILER FAILURES UNDER HYDRAULIC TEST

The great value of a hydraulic test as a supplement to visual inspection is acknowledged by all concerned in the management and safe working of steam boilers, and cases in which the timely application of a water pressure test has revealed important defects are of constant occurrence. The fact that a boiler successfully withstands a hydraulic test should not, however, be taken to indicate that it is free from serious defects, as experience proves to the contrary.

Two cases of failure under hydraulic test, due to effects that could not have been discovered by visual inspection, are thus described in "Vulcan," and will be of interest as showing the utility of such tests in the case of very old boilers, even when the plates are apparently in good condition.

Example.—I.

In the first case, the boiler was constructed of iron plates, and was about 40 years old, but had not been worked for over ten years. In order to ascertain whether the boiler was suitable for a further period of service, a special examination was made, and it was found that the plates were generally in good condition. A hydraulic test was subsequently applied, and the pressure was raised to 120 lbs. per square inch. After this pressure had been sustained for ten minutes the shell of the boiler ruptured at the lower longitudinal seam of the second belt of plates from the front end.

The rupture started between the rivet holes of the seam, which was ripped along its full length, and the fracture then extended into the solid plate of the adjoining rings, as shown in the illustration. The longitudinal riveted seams were of poor design, the rivets being so closely pitched that the calculated efficiency of the joint would only be 59 per cent. of that of the solid plate, instead of from 65 to 70 per cent.

At the test pressure of 120 lbs. per square inch, the stress on the material where it failed between the rivet holes was equal to 20,900 lbs., or 9.3 tons per square inch of section, a stress well within the elastic limit of good iron boiler plates, and which, therefore, should not have damaged the boiler if the plates had been in normal condition. The fractured plates showed a clean and new break of a crystalline nature, and there is no doubt that the failure of this boiler was due entirely to fatigue of the material, as a result of the stresses set up under ordinary working conditions extending over a long period of service.

Example.—II.

In the second case, the boiler was about 25 years old, and was constructed of steel plates. As in the case of the first boiler, the longitudinal seams were lap-jointed with two rows of rivets, and the shell similarly ruptured under hydraulic test at one of the longitudinal seams. In this instance the fracture did not follow the line of rivet holes for its full length, but extended into the body of the plate outside the rivet holes. The test pressure in this case was raised to less than 50 per cent. above the working pressure, and the fracture was clean and bright, while the thickness of the plate was the same as it had originally been as that part had not been reduced by wasting or grooving.

This boiler had a fair calculated margin of safety, so that the stress in the plate set up by the application of the hydraulic test did not exceed the elastic limit of the material had it been normal.

(Continued on page 34.)

What Constitutes Sanitary Heating?

The Question of Heating is Not Given the Attention Which it Deserves by Most of the Trade. No Heating System Can Give Maximum Results if Ventilation is Neglected and Unless a Change of Air and a Certain Amount of Humidity are Provided

IT is a very common thing to hear people say, "If experts disagree, how can the common folk tell who is right, or what would be the proper course to pursue?"

And no doubt such is the case. We hear the manufacturers of warm air furnaces declare that steam or hot water heating is not fit to install, they quote and misquote the opinions of all sorts and conditions of men to prove these assertions, and finally when trying to make a sale wind up by saying to their prospective customer:

> "And besides all these features which prove our warm air furnace is far superior to steam or hot water, look at the cost?
>
> I will install my furnace complete for the small sum of $87, and the very lowest figure you could dream of paying for a steam installation would be round $250, and hot water would cost you $350. Just look at the money you are saving?"

The next man comes along with a plausible story about furniture drying out, air becoming over-heated, dusty, dirty, etc., etc., if a warm air furnace is installed, then finally tries to show that nothing beats a hot water system.

"Steady heat, easy to regulate uniform heat, all over the house no matter which way the wind blows. No basement filled up with tin pipes, etc."

The next to come along is the fellow who has steam specialties to dispose of. He never speaks of the "tin box," as he calls it if asked about it, it's beneath his notice. What he has to sell is the real thing, "Hot water best, bah! absolutely nothing in it.

"Look at the big sized radiators you require in a hot water system! You never know when a pipe is going to leak, if you leave a window open the radiator is very apt to freeze, basement ceiling full of piping, got to have every radiator turned on whether you want to heat the room or not. If one single leak appears the whole system has to be turned off, and you've a big bill staring you in the face.

"Not so, with a steam heating system. No, no! You can fire any old stuff into the furnace and raise heat with it. Spring and fall you simply light a fire, shoot up a little steam through the house and let it go at that, same at night. Not so with hot water. If a pipe leaks all you've got to do is to turn it off and fix it. Never interfering with the rest of the job.

"No high pressure, just vapor steam, one-third less sized radiators, automatic dampers, 90 per cent. less attention required than is the case with a hot water system."

All such arguments do not amount to anything, all three heating men, are right and they are also wrong. The faults are not with any particular system, but rather with the way it is installed.

The reader will note by reading carefully that price has nearly always been the basis of them all.

If hot air furnaces without exception were all built upon lines which would ensure a frequent change of air from the outside, not re-circulation, if the water pans fitted to them were in proper proportions, and such as would ensure from 30 to 55 degrees of humidity, if provision were made to exhaust the air completely, a certain number of times an hour, then we should not find very much fault with warm air furnace heating.

The same may be said of hot water heating to some extent. Better ventilation, more frequent change of air, provision for supplying humidity, no short circuits which cause sluggish circulation, would tend to obviate the drawbacks mentioned.

With steam heated homes the same conditions arise. None are right and certainly not sanitary if no provision is made to ensure perfect ventilation, change of air and humidity.

The fact of the matter is that each and every one of these heating engineers have only considered the question of effective heating, they have not considered the matter from a sanitary standpoint, and even medical men are taken unawares.

For instance, we quote the following which appeared in a recent American hardware paper:

Steam Heated Houses Not Healthful Says Commissioner of Health

Steam radiators are party to be blamed for American "unpreparedness," Dr. —— a Health Commissioner of ——, told a company of students in a recent address. They are to be blamed, he said, because the first unit of preparedness is health, and it doesn't exist in steam-heated homes.

Here are some of the physician's views:

"In 1860 the United States had more of the first elemnts of 'preparedness' because men lived out-doors, wrestled with nature, knew how to shoot, didn't have 'great cities.'

"To-day inhabitants of the United States are less hardy, less well 'prepared,' because they are living in homes that are steam heated, air as dry as the Sahara desert.

"Even in the country the men aren't 'prepared' as they used to be, because steam heat has invaded the farm house."

The Sanitary Engineer took the matter up with this commissioner, and received the following reply:

"Editor The Sanitary Engineer:

"Your letter of February 2nd, in regard to an article which appeared in an American paper is before me. I quite agree with you that my remarks should apply to over-heated homes of any kind, and not exclusively to those heated by steam.

"It is undoubtedly true that we have much to learn in regard to the principles governing the ventilation and heating of buildings of all classes, and the degree of humidity to be maintained, and the methods of accomplishing the desired results.

"All we can any of us do, I suppose, is to 'keep everlastingly at it,' and eventually we shall attain a degree of success."

The next question is how shall we go about improving these conditions? By simply taking the firm stand that heating and ventilation is not merely heating, and that a warm house is not by any means all that can be desired.

In fact, under certain conditions, the very opposite may be best for one's health.

Just to illustrate our point: The people who live in hot climates of the tropical regions the year round are not half so sturdy and strong as those people who live in such countries as are situated in our own latitude.

It is just as easy to have a warm unhealthy house as a cold and unhealthy, in fact, more so.

The most essential point to consider is that the air we breathe should be reasonably warm and pure, with a certain degree of humidity.

What Is Competition?

Sound Business is Being Wrecked by Competitors Who Have No Regard for the Rights of Others—Quality Will in the End Prevail, and Those Executing High-Grade Work Must Maintain Price.

Monthly letter by the Master Builders of Boston.

THE use of other methods for handling or awarding building contracts, in preference to the badly misused competitive plan, seems to have gained most favor in the vicinity of New York. This is at first surprising to those who look upon New York as the natural home of the sharp-fanged wolf, the rare saber-toothed tiger, and of the original Wall Street—for among such fauna, they might say, does modern cut-throat competition in the business of building flourish like the proverbial green bay-tree. And yet, even should these prejudicial opinions stand the white light, it is natural enough that a district suffering most should seek relief the most diligently.

At West Point, where our National Government has been spending millions for building construction, the cut-throat competitive plan was used as long as possible — until altogether too many buildings were being completed by the bondsmen of the contractors. Then followed the plan of letting work on a cost and commission basis, with a maximum guaranteed, and with a further commission to the contractor on any savings effected, and bringing the final price under the named maximum. The percentages were so arranged that the contractor made more money by saving than by spending — a precaution found needful when dealing with—shall we say anybody in "rude business?"—yes, business ethics are peculiar.

This newer plan or some modification of it, is growing in favor even around Boston—for one can by taking thought may see that to compare a half dozen contractors and their prices is like comparing a half dozen tailors. If these are chosen very much at random, the suits they make may vary in price between $20 and $60—while a more careful selection will get a variation in price between $45 and $60. But what is the use of doing it? And why does the $60 man stay in business? Of course it is because he is not put into price competition with the others all of the time—and yet even the lowest-priced man has his place if he does honest work worth the price he charges. Owners realize this with a suit of clothes, for they have had the experience of buying such things every season. But building is different(?)—but the only difference in treatment is on account of the typical owner's lack of knowledge and experience.

EDITOR'S NOTE

This article will be found to be of unusual interest to every reader of The Sanitary Engineer. It deals fully and admirably with a problem which is very near to every member of the craft.

Competition these days is not something which should be the life of trade, but rather the reverse.

Coming from builders, as it apparently does, it is little short of refreshing.

One thing, however, which to our knowledge has never been properly considered is that of estimating free. Without doubt this subject is due more consideration than is being granted to it.

We would like to draw the attention of our readers to one paragraph in this article which reads as follows:—"On a house some distance from Boston, about 10 years ago, three bidders figuring about alike were above the price set by the owner for his expenditure. The architects, a leading firm, told him he could cut down his requirements, or could get another series of bids from men doing a lower grade of work. He chose the latter alternative and his house was built within his price."

Here was an instance where no doubt the architect secured his fee for any extra trouble or expense incurred in procuring other bids. But how did the unsuccessful bidders fare?

The Sanitary Engineer maintains that the sooner free estimates are dispensed with, just so soon will fair competition come to the fore.

Owners, as a rule, are misled by three things. First of all, the plans and specifications of their architect are set up by them as a standard for what they want done in the way they consider proper, and they assume these documents, coupled with the architect's superintendence, to be sufficiently compelling to obtain these desired results from any contractor at any price. As stated, the last few words signify an extreme case; but to an extent this is the viewpoint of the typical owner. Architects do not believe it, for they know that words are not capable of expressing what is wanted for quality of result—and no standards are available for comparison. An architect's interpretation of desired and proper quality cannot be enforced on a contractor incapable of giving it, be he ever so willing to give it. If, perchance, the protest is carried as far as the courts, the contractor then wins—for a question of quality in building operations cannot be appreciated by a jury. (A review of scores of cases in several states shows the truth of this statement.) A jury recently declared that a plain maple floor was good enough, and satisfied a requirement called for parquetry flooring.

The second point in the misleading of the owner is in the bids themselves. In spite of average care in the selection of bidders in a competition, the bids received will vary widely—the low being so far below the high that the typical owner feels sure that estimating is inexact, and that there is little about the price which will much affect the result he will get.

Then, as a third feature of his misleading, he gets no later opportunity to learn differently—unless his work is very poorly done—for when he begins to spend, in driblets perhaps, but yet to spend, for repairs and things he did not "expect to spend money on so soon, Heaven knows," but then "everybody's doing it"—even then Mr. Owner does not have an opportunity to learn that perhaps his neighbor's outlay for upkeep is one-quarter of his own, nor possess sufficient impartiality to see that his neighbor's property continues to look fresh and in good condition, while his own does not.

It would be foolish to allege that an owner, in accepting a low figure, expects usually, to get what he does not pay for. He believes that variations in estimates are due to inaccuracies or to larger profits taken by higher-priced men. Neither is true. Estimating is an exact science. A careful contractor, working on good plans and specifications by an architect with whose work he is familiar, gets his cost within two per cent. on new work, and will average but little higher on alteration work. A low-priced man can easily make as much money on a contract as a high-priced one — unless the low price is due to inability. Many an owner, on small work, has been impressed with the argument put out by small contractors that they can work cheaper because they have not so much expense to carry. And yet the man assenting to this argument may himself be in an organization which knows by experience that up to a certain limit (?) the larger a business is the less it costs to do a thousand dollars' worth. The low-priced man is low, usually, because of a difference in quality of result. An owner who

relies upon his architect to produce a proper result under all conditions is very often expecting the proverbial silk purse from a sow's ear. Good architects do not claim to do it—and the most successful among them aim for good contractors and shun those not doing the grade of work they want to get. A leading Boston architect voiced this opinion in saying, "Architect and contractor must both be good or the result is poor."

What is competition?

Competition is the life of trade.

Competition is the death of trade.

Your choice of phrases will vary as you are a buyer or a seller; as you have downed a competitor or are being stifled; or, you may say, Competition is the other fellow after my job, the other man after my customers, the fierce struggle for life and means.

Competition! Unions will have none of it, neither will socialists nor capitalists!

What is competition?

Is it the success of the strong, well-managed, and efficient over the shrewd, the tricky, and the deceitful? Obviously not,—when price is a large factor in the result,—although the reverse may be true. One writer calls it a legalized form of struggle for annihilation in modern life. Any proposition that contractors, or any other producers, may be encouraged to ruin each other in order that the community may get something at cost or less is unworthy.

Trade has always had one meaning synonymous with trickery, and any business man need only recall personal experience and observation to know that business with its competition has been at best only a war of wits in a game the rules of which are business ethics. Business ethics,—what are they? Certainly a very peculiar brand.

And what of competition at its worst? And who suffers from the results? In the business of building he is called the owner. Does he know this? No, not at the time; usually not at any time.

What is competition?

On a bank alteration job, an alleged ambiguity in specifications led to one contractor's success. He found, after he had expended about one hundred dollars on the job, that the architect was expecting him to do things he had not estimated to do. Inquiries easily established the fact that four other bidders had all included the items in question—the successful one had not. Owner, architect, and builder each paid one-third of the cost of the error, about one hundred dollars each. But what of the unsuccessful bidders?

On a house some distance from Boston, about ten years ago, three bidders figuring about alike were above the price set by the owner for his expenditure. The architects, a leading firm, told him he could cut his requirements, or could get another series of bids from men doing a lower grade of work. He chose the latter alternative, and his house was built within his price.

On a job of interior finish, some distance from Boston, three or four years ago, three Boston bidders doing a similar high grade of work were within one thousand dollars of $137,000. The work was let for $92,000 in another city, and, even after adding on an acknowledged error of $25,000, the successful bidder would still have been 16 per cent. under the Boston men. None of the Boston men would have made over $15,000 on the job.

On a small job in a small town, five figures were $9,500, $9,300, $9,000, $8,900, and $6,600. What is obviously within a few hundred dollars of the right price? The owner was delighted at the low price. Why should he have been?

On a recent bank alteration job, with six bidders, four were eliminated after the bids were in because they were not local men. Refiguring of cuts was done by the other two, and one dropped one thousand dollars more than the value of the cuts (finding he had to do so), and although still high was awarded the job because he was a depositor in that bank, while the other was not.

On a job in 1912, where cuts were figured, one competitor dropped five hundred dollars where twelve hundred dollars' worth of stone mason's foundation work was changed from stone to concrete in location where materials for either were easy to get. Cuts offer a splendid opportunity for one man to drop by another, and win by, in fact submitting a second figure when he surmises his first one was a little too high.

Recently, subcontractors for painting, figured so cleverely that the lowest on a job was $650 and the highest $2,180, with enough good men together around $1,500 to show that probably there was the right price. Some contractors figuring would use the low figure, others not wanting to must do so, or risk their chances of winning. This element is a common feature of competitive bidding.

In September, 1915, a reputable Boston architect of a fairly large job stated that the owner had a fixed price set for his work, and that he had purposely selected a list of bidders commonly varying widely in price and in quality of result. From them he had chosen as good a man as he could, and come within the price established; and he said that he regretted not being able to choose a better man.

Two or three years ago, an owner who formerly let a contract to a bidder about twenty per cent. under a group of competitors, and who was not satisfied with the results obtained, strove to mend matters upon some further work by a most stringent three-years' guarantee—the strongest document of the sort ever seen by Boston contractors who estimated the work. This document was the work of the owner, not of his architect. Here was a direct intent to make a silk purse out of a sow's ear by legal verbiage—followed, if needed, by legal procedure.

A few years ago a very hard-fought large job near Boston was awarded to the contractor fourth from the bottom in a list of six bidders. Later, he was told that the owner always intended him to do the work.

Recently, on a job a few miles from Boston, the owner told one bidder that he wanted him to do his work, and that he would pay a preference, but not a large one. The job went to another man, who by the use of two subcontractors, whose bids the preferred man had but did not care to use, saved more than the difference between the two figures.

In 1915, a job near Boston had four bidders within a fifteen hundred dollar variation figuring around $62.000, while a fifth was about $50,000, and won the award. What will happen to the winner and to the work he does? What was the owner's reasoning?

"Time is of the essence of this contract." How often this is written! A year ago a large job was let to be completed August 15, 1915. On October 1, 1915, it was nearly done. A contractor's promises for time are commonly taken in preference to an examination of his performances.

Not long ago the wife of an owner told a friend about to build to put a forfeit clause into his contract, for the reason that it could always be collected, for some reason or other, and was a good way to save on a contract.

Recently an architect asked for two bids from general contractors. With one of these the architect was in league to the extent of giving him competitor's prices in order that he might bid under them—and the other contractor knew it—and knew the owner. After the bids were in, he approached the owner thus: "Now, Mr. Blank, I have a grudge against Smith, my competitor, and I can work it out and show you how to make a thousand dollars if you will give me fifty dollars." Mr. Blank agreed. "I will go to your architect, claim I made a mistake, withdraw my bid, put in another one, one thousand dollars lower; your architect will tell his friend, who will do the same thing. You will make a thousand, and can then send me fifty." It was all done as planned.

(Continued in next issue.)

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

Article 23

Water Softening

As water percolates through the soil and rocks objectionable organic and bacterial matter, if present, may be filtered out but mineral matter is dissolved out of the soil and rocks and the water becomes "hard." The mineral matter or salts that may become dissolved in water due to this cause are carbonates, sulphates, and to a less extent chlorides, of calcium and magnesium. Rain water and snow being free from these mineral salts produces a "soft" water. Surface waters contain some salts in solution and ground waters as a rule a greater amount.

It is a disputed question whether a hard or a soft water is better for drinking purposes from a health standpoint. Mineral waters may have a value for medical purposes but have not been always favorably regarded as a general supply. It has been supposed also that very hard waters used as a drinking water were the cause of certain diseases. However, recent statistics go to show that the death rate is not raised or lowered by the softness or the hardness of water.

From recent tests made in the state of Massachusetts the hardness in water used for drinking purposes was found to range from 4 to 150 parts of mineral salts in solution in 1,000,000 parts by weight of water. The average hardness of the softest waters was found to be 17 parts per million and 5.7 parts for surface waters. Also the average hardness of the hardest water was found to be 71 for ground and 41 for surface waters. This would indicate that the ground waters averaged about twice the hardness of the surface waters. A general classification as regards hardness might be given as:

Parts of mineral salts in a million parts by weight of water.	Kind of water
Less than 75	soft
Over 150	hard
Over 250	very hard
Over 350	excessively hard

While there may be no objection to hard water from a sanitary standpoint, there are objections to its use for domestic or manufacturing purposes. Excessively hard waters impair the flavor of many foods cooked in them. The housewife does not like hard water for laundry purposes. Hard waters destroy soap because insoluble precipitates are produced ("curdling" of the water) and it is therefore necessary to use a much larger quantity of soap before a lather is produced. It has been estimated that the loss due to waste of soap for domestic purposes amounts to ten cents per million gallons for each part per million of hardness. For a family of five and a water with a hardness of about 300 parts the waste of soap might cost from five to ten dollars per year.

The advantage of a water supply from a river or lake over a well water supply in this connection is apparent. In rural districts rain water can be collected in cisterns for laundry purposes. In cities this is often impracticable and water softening plants have in some cases been installed where the available supply is very hard or excessively hard.

For some manufacturing purposes and especially for steam boiler use a soft water is essential. Boiler "scale" caused by hard water is very difficult to remove. When such deposits form in even a thin layer in a boiler one result is loss of heat. Also the life of the boiler is shortened, increased repairs and attendance are necessary and there is increased danger of explosion. All waters contain carbon dioxide gas (CO_2) in greater or less amounts in solution. Soil containing carbonates, for example limestone rock, are dissolved by such waters in proportion to the amount of CO_2 present. Boiling such a water drives off the CO_2 and the then insoluble carbonates are deposited. The amount of hardness that can be got rid of by boiling under ordinary atmospheric pressure is known as "temporary hardness." In any tea kettle where hard water has been boiled lime or carbonate deposits can be seen. This is one cause of deposits in boilers but the objectionable "scale" is caused largely by calcium sulphate. At boiling point, 212 degrees Fahr., it is still soluble in water but when, under pressure, the water in the boiler reaches a temperature of over 252 degrees it is practically insoluble and is deposited on the sides of the boiler. Fig. 54 shows a diagram of a typical water softener of which there are many kinds. It is thus described:

> There are two tanks side by side, one for mixing and precipitation, the other for further sedimentation and filtering. They are in communication through an opening near the bottom. The incoming water actuates a wheel which drives two stirrers in the lime and soda reservoirs respectively. The hard water passes into a funnel with a long shank reaching to the bottom of the settling tank, and as the water rises it lifts two ball-cocks and admits the solutions of chemicals to the funnel, so that good mixing is obtained. When the tank is full, the water rises in the funnel and turns the ball-cock valves, which cut off all inlets. The lime tank is fed with water by a regulating tap, while the soda is generally brought into solution with hot water. In the second sedimentation tank the water rises up to a filter which can be taken out and cleaned."

The lime water is for the purpose of reducing temporary hardness. It unites with the CO_2 in the water which cannot then hold the carbonates in solution and they are deposited. The soda tank contains carbonate of soda (washing soda) which through chemical action causes the permanent hardness salts to be deposited. The cost for small water softening plants has been given at 4 to 15 cents per gallon. Such plants are used by railroad companies in softening water for their locomotives.

In softening water the result is to also greatly reduce the amount of bacteria present in the water and hence purification may be accomplished at the same time.

Water Purification

When by analysis or inspection a

water supply is suspected but is the only available one, some method of purification has to be adopted. In this article we are mostly concerned with the methods to be used in the household. Too much importance cannot be attached to the purification of our drinking water which in too many instances in Canada is polluted—it is a matter which directly affects the health of every one and may at times, as in the past, become a matter of life or death.

There are several methods, now to be described, for the household purification of water, some of which might be used to advantage even where (as in a city) the water has been previously filtered or treated in large amounts.

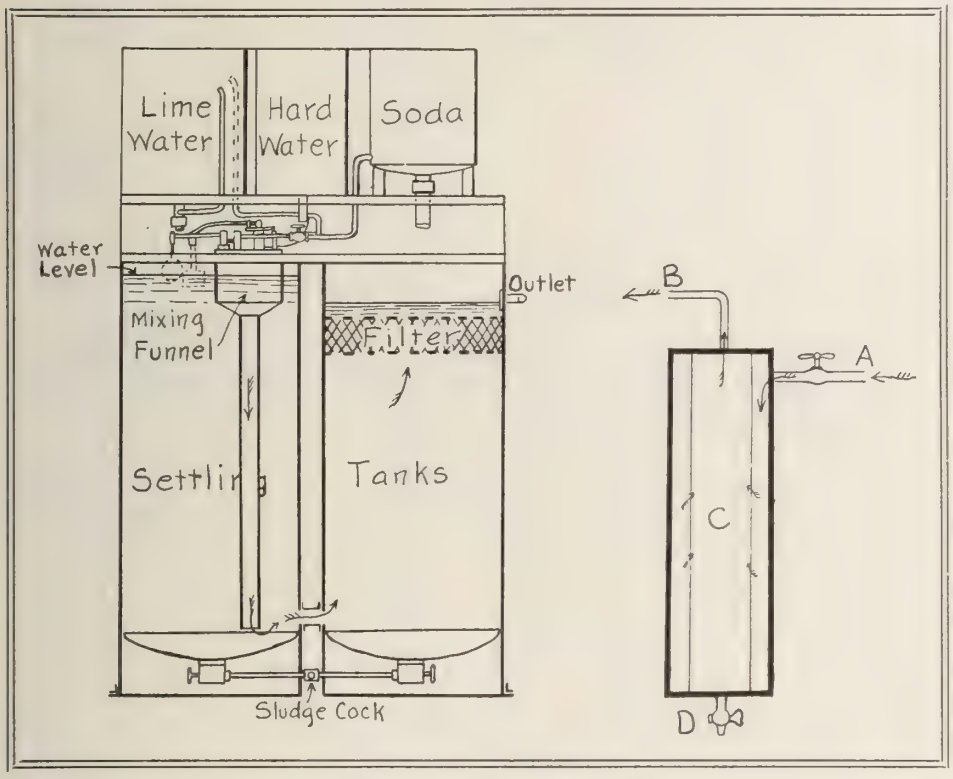


Fig. 54.—Doulton's Water-softener. Fig. 55.—Diagram of a Berkefeld Filter.

Domestic Filters

From Public Water Supplies by Turneaure and Russell:—Frequently it is advisable to purify water supplies for household use. For this purpose a large number of different filters have been devised, but many of these are so inefficient as to be worse than useless; for it not infrequently happens that the possession of a filter lulls the consumer into a state of false security. The best of these filters suitable for household use are those that are made of unglazed porcelain (Pasteur filter) or fine infusorial earth (Berkefeld filter).

Filters of this class are comparatively porous, thus permitting a fairly rapid flow. In this respect the Berkefeld is superior, as it filters considerably faster than the Pasteur. Both of these filters deliver a wholly germ free filtrate when they are first put in service, but unless close attention is given them they sooner or later lose this property. The pore spaces in filters of this class are not smaller than the bacteria that ordinarily abound in the raw water; hence the removal of these organisms is not purely mechanical. There seems to exist a sort of attraction between the bacteria and the particles composing the filter, so that the former are prevented from being forced through the pores. As additional water is passed through these filters, the pore spaces become reduced in size, owing to the accumulation of organic or other matter, until finally a living pellicle or membrane is formed on the outer filtering surface. This increases the resistance offered to the passage of the water and consequently diminishes the flow of the effluent. The bacteria that abound in this slimy pellicle are not destroyed, and if the temperature is favorable they begin to grow. Under such conditions, the bacteria capable of multiplication force their way through the pores of the filter and so appear in the filtrate. Filters of this class therefore retain their germ proof qualities for periods that are in a way inversely proportional to the temperature of the water. The lower the temperature of the water, and therefore the slower the development of the contained bacteria, the longer the filtrate will retain its sterile condition. Generally speaking, these filters should be cleaned and sterilized in boiling water or in steam under pressure once a week in order to kill out the germ life that has found lodgement in the pores. In this way not only is the sterility of the filtrate maintained, but the yield of filtered water is increased. The more rapid rate of filtration in the Berkefeld as compared with the Pasteur filter makes this filter lose its efficiency more rapidly. In times of epidemic disease entire reliance should not be placed in the operation of these filters as it frequently happens that some of them are defective. An outbreak of 145 cases of cholera in a single regiment of 650 men occurred in 1894 in Lucknow, India, as a result of an imperfect filter in use in the barracks; but in general the use of the best filters has reduced the amount of water borne disease. This is especially noteworthy in the garrisons of the French army, where the typhoid death rate has been much lessened. Rideal mentions an instance in the barracks at Melun. In 1889 there were 122 deaths from this disease; after the introduction of the Pasteur filter, the average mortality for the next seven years was only seven.

Filters of this class are not often used for municipal purification, but are admirably adapted for schools, garrisons, prisons, or hotels as well as for private use.

Other types of household filters, such as those constructed of porous stone, charcoal, or asbestos have been on the market for many years. Judged from the popular standpoint of purity, which is generally the production of a clear water, many of the filters would be regarded as quite satisfactory, but as a means of removing germ life they possess for the most part but little merit.

Fig. 55 shows a diagram of the Berkefeld filter. It consists of an iron cylinder enamelled on the inside and containing a candle C of compressed "kieselguhr" which candle or core is the filtering part of the apparatus. The water enters at A and fills the space between the iron cylinder and the core. The water trickles through into the central bore and the filtered water leaves through outlet B. There is a scour pipe at D, and there are nuts at the top of the cylinder (not shown in the diagram) by unscrewing which the filter C can be removed, cleaned by scrubbing and sterilized in boiling water. A Berkefeld filter with one core as shown, if attached to a tap which was under a pressure of from 35 to 40 pounds per square inch would yield from 20 to 30 gallons of water per day. A Pasteur filter is somewhat similar in construction but the filtering part of the apparatus is of unglazed porcelain.

In the next article other methods of water purification will be discussed.

Pneumatic Water Storage and Supply

Pointing Out the Governing Principles of the Pneumatic Water System—All Systems Should Provide For Furnishing Air to Replace Loss by Absorption

By R. O. Wynne-Roberts, Consulting Engineer, Temple Building, Toronto.

IT is unfortunate that pressure water tanks have collapsed in a number of instances, because not only do these occurrences cause risks of the loss of lives and damage to property, but they create considerable uneasiness, which doubtless will react against the installation of new plants, unless steps are adopted to safeguard the public. Therefore, in the interests of sanitary engineers, it is desirable that steps should be taken to standardize the construction of the tanks and fittings and to regulate the conditions under which they should be operated. Sanitary engineers would be well advised if they took up this matter, inasmuch as it is not only easy to undercut tenders by providing tanks and fittings of poor construction, but the engineer's reputation as a whole is undermined by such transactions.

It is not intended to discuss the question of tank construction in all its phases in this article, for there are many excellent books on the subject which can be studied by those who desire full information. But the rudiments may with advantage be realt with. As C. T. Mason states in his interesting book, entitled "Arithmetic of Boilers," the spherical vessel is the strongest, and to understand the problem of calculations it will be the first example to consider.

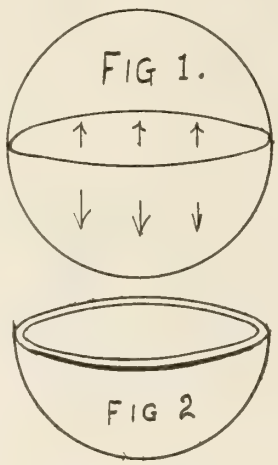
Suppose Fig. 1 represents a hollow iron ball and Fig. 2 represents one-half of such ball, water is pumped into the ball and the pressure within the ball exerts an equal force in all directions on the internal surface. This force tends to separate the ball into two halves, and the iron resists the force so far as its strength will go. Suppose the thickness of the iron is represented by "t," the average diameter of the iron vessel is "d," the pressure applied is "p," then taking a horizontal section, the total force will be $d \times d \times .7854 \times p$, and the total area of iron resisting it will be $d \times 3.1416 \times t$. If we want to find out the stress "s" caused by the total force on the sectional area of iron, the formula will be $s = \frac{d \times d \times .7854 \times p}{d \times 3.1416 \times t}$ or $\frac{d \times p}{4 \times t}$

Working out an example to make the calculation clear, suppose the diameter of the spherical tank is 4 feet, or 48 inches, the thickness of the shell ¼ inch, the pressure 40 lbs. per sq. inch, then

$$s = \frac{48 \times 48 \times .7854 \times 40}{48 \times 3{,}1416 \times .25} = \frac{48 \times 40}{4 \times .25} = 1{,}920$$

lbs. per sq. inch.

Water tanks, however, are not built on this plan. They are cylindrical in form, and in this case the pressure also tends to separate the tank into two halves, as indicated in Fig. 3. If there



is a joint around the middle of the tank between the two ends, it must also be considered.

In such a cylindrical tank the pressure = "p," the average diameter of the iron shell = "d," the length = "l." The total force will be $d \times p \times l$, and the resisting power of the iron will be the thickness of the shell on two sides, the length of the cylinder and the thickness of the iron, or $2 \times t \times l$, so if it is desired to know what is the stress "s" the formula will be $s = \frac{d \times p \times l}{2 \times t \times l}$ or $\frac{d \times p}{2 \times t}$. Suppose the tank is 48 inches in diameter, 10 feet long, and ¼ inch thick, and the pressure 40 lbs., then

$$s = \frac{48 \times 40 \times 10}{2 \times .25 \times 10} \text{ or } \frac{48 \times 40}{2 \times .25} = \frac{1920}{.5} =$$

3,840 lbs. per sq. inch.

If the thickness of the plate to stand whose pressure is desired to be known, then if "s" equal to 10,000 lbs. per sq. in. is allowed, the theoretical thickness would be $= t = \frac{pd}{25} = \frac{40 \times 48}{2 \times 10{,}000} = \frac{960}{20{,}000}$ = .048 inch, or 3-64 inch.

If it is desired to know what pressure such a tank would be theoretically capable of carrying, the formula would be

$$P = \frac{2 \times t \times s}{d} = \frac{2 \times .25 \times 10{,}000}{48} = \frac{5{,}000}{48}$$

= 104 lbs.

The matter of allowable pressure in actual practice will be referred to again.

Tanks and boilers are ordinarily built with joints, welded or riveted, and as steel plates are not always free from flaws and irregularity in thickness, allowances have consequently to be made, and several other calculations undertaken, to arrive at the required details of construction. Those interested in this subject should obtain a copy of the Ontario, Saskatchewan and other provincial boiler regulations, which give information as to what conditions are necessary. It is probable that when new regulations are promulgated for pressure tanks there will not be much difference in the requirements from those for steam purposes. The following are the outlines of the Ontario regulations in respect to construction:

The minimum thickness of any plate used to be ¼ inch, and the boiler heads having diameter up to 40 inches thickness to be not less than 5-16 inch; over 40 and up to 52 inches, ⅜ inch; over 52 and up to 60 inches, 7-16 inch. Over 60 inches, 1-16 inch extra for each 6 inches extra diameter, reinforcing plates to be provided where pipe connections or manholes are located.

The maximum working pressure allowed is according to the following formula, using the same notation as before:

$$p = \frac{2 \times t \times s \times k}{d \times f}$$

p = Maximum allowable working pressure per sq. inch.
t = Minimum thickness of shell plate in inches.
s = Tensile strength of steel plate in pounds per sq. inch, say, 55,000 pounds.
k = Co-efficient for longitudinal joint.
d = Inside diameter of outside course of the shell in inches.
f = Lowest factor of safety.

It will be observed that this formula is an elaboration of the one previously given, and includes two new factions K

and F to meet working conditions. The factor of safety starts at 4.50 for superior work, but when the construction is inferior, additions are made which automatically reduce the allowable maximum working pressure. For example, 0.23 is added for holes in longitudinal seams which are fair and good, punched before bending edges of plates, and reamed after assembling. In this case the factor of safety would be 4.5 + 0.3 = 4.8. There are about 18 factors in the regulation, which may be added singly or in about four classes. Consequently, an unsatisfactory pressure tank would be seriously handicapped by a heavy factor of safety.

The maximum pitch of rivets is fixed by the formula: Pin = (C×T)+1.625.

Pin = max. pitch of rivets in inches.
C = constant given in table.
T = thickness of plate in inches.

The least diameter of rivet to be 5/8 inch after driving, and in no case less than one thickness of plate.

The efficiency of riveted joints depends upon many conditions, such as whether the joint is lap or butt (see sketch); whether single, double or treble riveted; the distance between the rivets, and the manner of riveting, etc. The regulations prescribe formulae for these conditions, but space does not permit including them in this article. Those who are interested in this subject can easily obtain a copy of the regulations and the formulae can there be studied.

Convex heads, which are spherically dished to a radius equal to or less than the diameter of the shell, require no stays if the thicknesses are 1-16 inch greater than the shell plates. Concave heads are considered as only 60 per cent. of the strength of convex heads.

The water test applied to boilers is 150 per cent. of the working pressure.

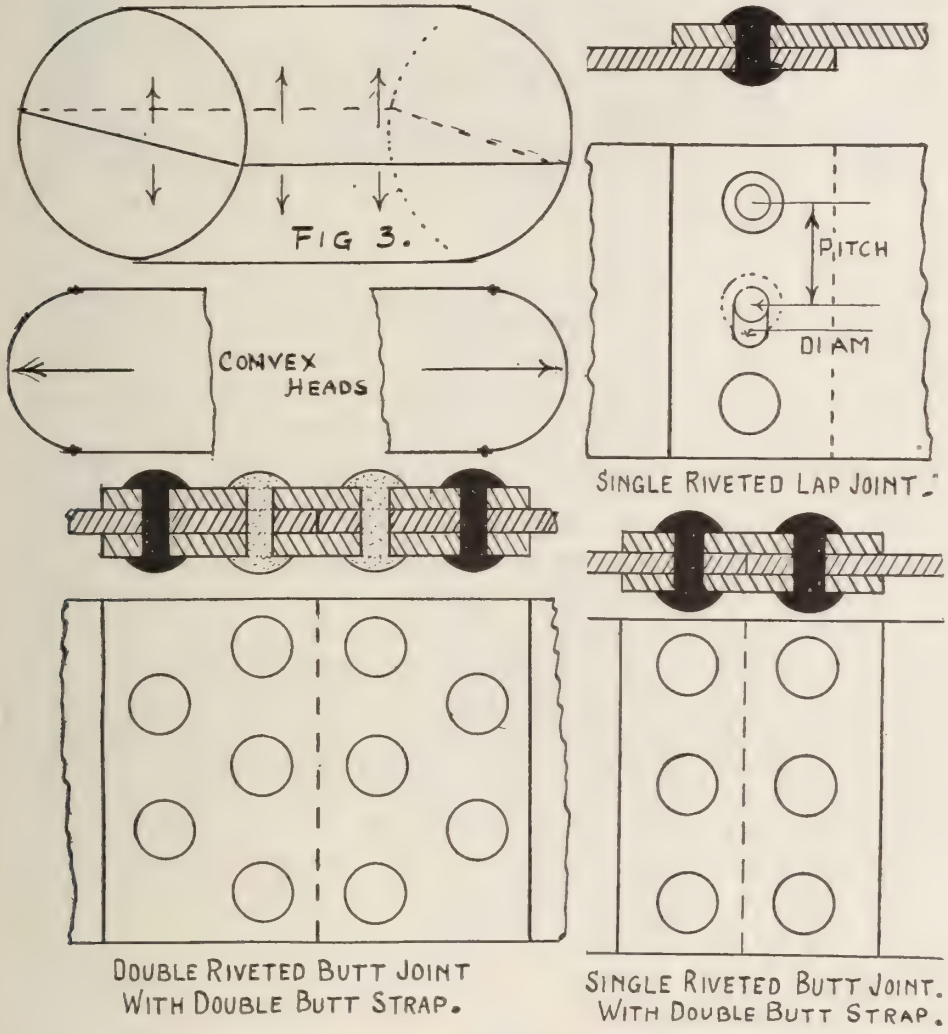
Safety valves are stipulated for water pressure tanks.

In conclusion, it may interest the readers if the allowable pressure in an example water pressure tank is given.

The tank is, say, 7 ft. diameter (84 inches), the thickness of shell ½ inch, the tensile strength of the plates 55,000 lbs. per square inch, the coefficient of strength of a treble riveted double strap butt, horizontal joints = 0.86, factor of safety 4.8.

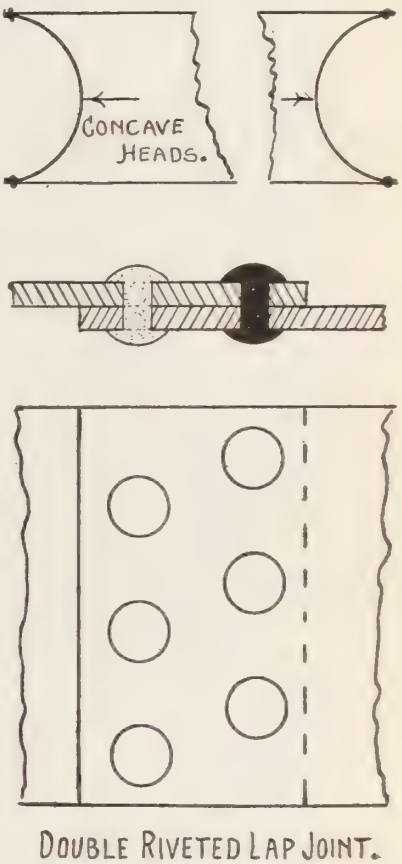
$$p = \frac{2 \times t \times s \times k}{d \times f} = \frac{2 \times .5 \times 55{,}000 \times .86}{84 \times 4.8} =$$

117 lbs.



CONSOLIDATED ENGINEERING CO., ACQUIRES MORE PLANT

All land, buildings, tools, machinery and equipment recently owned by the Massachusetts Fan Company, Watertown, Mass., have been purchased by the Consolidated Engineering Company, Chicago, who have commenced to manufacture blowers, fans and heater apparatus at Watertown. John E. Anderson, for the past twenty-four years a ventilating engineer and for the last seven years with the B. F. Sturtevant Co., Chicago office, in charge of the ventilating and cooling department, has been appointed sales manager in charge of the Massachusetts Blower Department and Kinealy Air Washer.



The land area of the blower department comprises 70,000 square feet, and the buildings have a floor space of 50,000 square feet.

In addition to this, the Consolidated Engineering Company are now erecting at 28th Place and Shields avenue, Chicago, a new factory 85 x 233 feet, to be occupied May 1, 1916.

The Consolidated's line of manufacture now includes: Van Auken System of vacuum heating; Van Auken steam heating specialties; Thermograde modulation system of heating; Kinealy air washers; Massachusetts blowers.

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MARCH 1, 1916

AN IMPORTANT STATEMENT

As every reader knows how thoroughly THE SANITARY ENGINEER endorses the "Back to the land movement" and what it means to our profession, it will not be out of order for us to reprint certain parts of a statement which Baron Shaughnessy is said to have made. He is very optimistic about the future of Canada, but he lays great stress upon the necessity of putting more land under cultivation, in the following words:

"If my advice and influence are of any avail, we shall see in Canada the biggest thing in the way of land settlement that the world has ever known.

"Those of us who are familiar with the work of securing immigrants know that on the European continent, and in England as well, there are a great many men who would have liked to come to this country or to the United States, but were more or less tied to the small plots of land they were cultivating, and therefore hesitated to break up their homes and leave for a new country. These men have been disturbed by the war and their ties have been broken. Many of these will come here to start again and rehabilitate their broken fortunes.

"Then again, there are many thousands of strong, healthy young men with ambition who hitherto have been engaged in indoor occupations who will hesitate, I think, with the experience of active service and the outdoor life, about going back to their old occupations. They will want to try farming. If we formulate a scheme to get them started, with a reasonable degree of knowledge of farming careers, I believe they will be very glad to avail themselves of it. That is what we must do.

"'I don't look for any rapid improvement in business,' Lord Shaughnessy continued, "but I think we have passed the bottom of the down grade and are climbing towards the summit again. It will take some time to reach the summit, but I cannot help feeling that we have passed the worst."

It will be noted what Baron Shaughnessy says about men who have been on active service preferring the farm to indoor occupations.

This, too, is a very significant opinion and if such takes place then sanitary and heating engineers will certainly reap no small benefit.

These men have, previous to going to the war, been to a great extent, city dwellers and have been accustomed to city conveniences.

The first things they will miss will be the bathroom, the housewife will miss her kitchen sink and running water, all of which, if installed, will tend to make more efficient and more contented farmers. Therefore, if our conclusions are at all reasonable, and we think they are, sanitary and heating engineers, by planning ahead, may create quite a nice field for new business and in the meantime the building trade in cities will tend to improve.

EFFICIENT INSPECTION

It does not seem very many years ago that the average plumbing inspector was regarded as one who simply came on the job to find fault with it, and the man who got his job passed without a murmur was looked upon as nothing short of a marvel.

Of course the reason, in nine times out of ten, was that the person acting as plumbing inspector was either a shoemaker, a blacksmith, a carpenter or almost anything but a practical plumber. Men were given these positions because of political influence more often than not and even to-day there are still quite a number of them in existence.

In such towns or cities where men of this class are holding positions as plumbing inspectors, the public are paying the piper every time.

This is the day of efficiency on the one hand, and extreme false economy on the other. To put an in-

competent man into a responsible position with a view to economizing is nothing but false economy.

There were always two extremes and Canada has passed from the one, that of spending too freely instead of investing in true service.

The Canadian people have, it is to be hoped, learned a lesson. But a much more severe lesson is in store if her people go to the other extreme, as apparently many are doing, by cutting down expenditure which is as necessary to our welfare as the food we eat.

Alderman Risk, the chairman of the Toronto Board of Health, proposes to place the plumbing inspection department in the architects' department, so as to effect an imaginary saving of $15,000. This proposal on the face of it is foolish. It reminds us of a story where an Irishman is said to have cut down the quantity of oats usually fed to his donkey. The scheme worked splendidly for about a month and would have been a success had the donkey lived, but unfortunately it died. We can see breakers ahead in the proposed change, and if not apparent for some time, the public will eventually pay the piper and in an endeavor to save $15,000, the cost will be anything up to half a million in cold cash without taking into account the toll in human life.

Sanitary plumbing will soon be nothing better than a conglomeration of unsanitary contraptions in the city of Toronto at a cost of $15,000, plus.

WHAT IS COMPETITION?

ABOVE is the title of a very interesting article appearing on another page of this issue. It is taken from the builders' standpoint, and at the same time sanitary engineers are mentioned in several paragraphs.

This article should be of particular interest at the present time, because of the movement on foot in Toronto to give the architect's department full charge of plumbing inspection. Though this is not the question the article at least puts the architect in his true light.

What is competition? Is it buying goods on credit and installing them in buildings at less than invoice price, then paying for them at a few cents on the dollar?

Is competition fair when your competitor does not know how to figure his overhead expenses? Can one call it competition when the specifications are so loosely drawn up that it is possible to put any kind of junk into a bathroom and still be within the wording of the specifications?

The writer has yet to see the specifications for sanitary engineering, drawn up by an architect, through which he could not, figuratively speaking, drive a team of horses.

The design of a machine is not what a patent is granted for, it is the claims made for the machine. All gasoline engines are gasoline engines, but their value is arrived at by their construction and efficiency of service.

If competition is ever to be the life of the sanitary and heating trade, conditions will have to be radically changed. Competent men will have to draft up true, honest specifications; competent men will have to tender on these specifications, and competent men will have to inspect, examine and pass judgment upon the work. And, last but not least, men will be held responsible for goods bought on credit and will have to pay 100 cents in the dollar.

Until these conditions are brought into being, competition will be the ruin of trade, as is the case to-day.

LOW COST OF SERVICE

ONE of the most vital questions to-day which is of interest to almost every one and which is being felt by everyone is "the high cost of living."

This should not and would not be if every person would take for his motto: "Maximum service for money received," instead of "Minimum service or goods for money received."

"Make money, and make it quickly; make it honestly if possible, but make it" is the motto of 90 per cent. of business men to-day.

And that is the reason and none other for the high cost of living. The war cannot be blamed, there is more money in the world than ever. The standard of living has improved, but the cost of this improvement has been offset by the increased amount of labor done or service rendered. The trouble is that in our hurry to get rich, we lose sight of the quality and quantity of service we should render. Inferior goods, inferior labor, poor installations have a lot to do with the high cost of living as well as the high cost of production.

But service, efficient service is always cheap. Just consider the large manufacturers who are taking greater interest in their employees. Look how low the cost of service is to them. In our own line of business we have the Crane Company, Chicago, or rather we should say "The World." Last Christmas this concern paid to its employees 10 per cent. of the salary which has been paid during the year 1915. A wage bill of seven and one-half millions of dollars meant that the Crane Company divided $750,000 amongst their employees for service received over and above the service paid for in salaries.

Low cost of service in actual practice is the only true way of counteracting the high cost of living.

Low-grade goods make costs run up. Low-grade labor means high cost of up-keep. The cost on the bill may be so low as to be out of sight. But the cost of upkeep is never out of sight. The only way to establish a good reputation is by buying high-grade goods every time. "Just as good" goods never gave maximum service at minimum cost.

New Central Technical School, Toronto

In This Article a Description of Boilers, Pumps, Heaters, Switchboard is Given, as Well as Engine Room and Power Plant. Second Article of This Series Continued From February 15 Issue

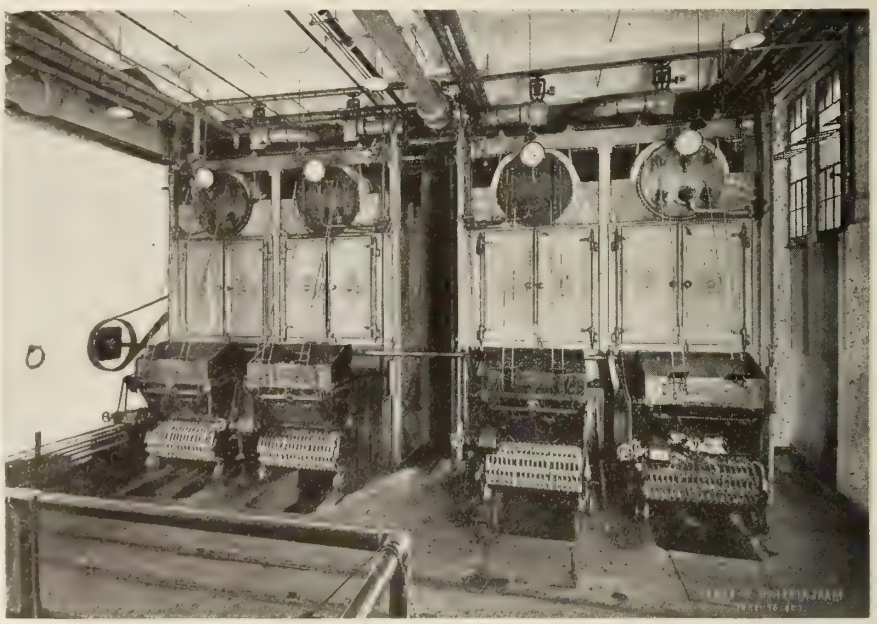
In the pump room are the boiler-feed pumps, circulating pumps on the heating system, feed water heater, live and exhause steam heaters, service water heater, swimming pool water heater, and filter.

The engine room contains a large high-speed engine and generator, a horizontal high-speed unit, a horizontal "Corliss" engine and generator, air compressor, engine and generator, air compressor, ammonia compressor and motor generator set. On the gallery is the switchboard, while on the same level, but outside the engine room are the operating engineers' room, locker and lunch room for the firemen, several store-rooms, shower bath and lavatory. In a small room off the engine room and at the same level is a transformer room and also the refrigerator room containing a tank for making can ice, also drinking water chill and filter. In the fan room are two large ventilating fans with air washers and heaters, a smaller fan for the smithshop forges, vacuum machine for the chemical and physical laboratories, a vacuum cleaning machine, and temperature regulator equipment. On this floor leading to the fans is a large cold air intake 10 feet high by 25 feet wide.

Boiler Installation

The boiler plant consists of four water-tube boilers, arranged in two batteries and having a total horse-power of 720. Each boiler is rated at 180 horsepower, and has a heating surface of 1790 sq. feet. The tubes are 4 in. in diameter and 18 ft. long, arranged in 8-sections wide, and 10-tubes high. Each boiler has one steam drum 42 in. diameter. The boilers are of standard forged steel construction and are built for a working pressure of 200 pounds, but are operated at 150 pounds per sq. inch. They are fitted with superheaters to give 100 to 120 degrees Fahr., and have chain-grate stokers each having a grate area of 35 sq. ft. The boilers and chain-grates were built and installed by the Babcock & Wilcox Co., Montreal and Toronto.

The boilers are suspended from steel girders resting on steel columns on cast iron bases. The flue dampers are operated by hand. The boilers are fitted with B. & W. type mixing valves, by which the temperature of the superheated steam may be controlled. They are also fitted with standard thermometer wells in superheat box. Auxiliary wells are installed in the steam line with steel mercury thermometers having gauges in front of the boiler giving reading of steam and superheat. Each boiler has two 2½-in. McAvity pop safety valves, one 12-in. brass cased steam gauge, one "Turnbull" high and low water alarm, two ¾in. water gauges fitted with automatic closing valves, one 2-in. diameter stop and check valve, one 2-in. diameter stop valve, etc.



View of Boiler Room. The four boilers furnish steam for all purposes throughout the building

Coal is fed to the grates through hoppers in front of the boilers. Each hopper is provided with a valve for shutting off the supply of coal to the fire and thus controlling the depth of the latter. Doors are provided at the front of the hoppers for hand firing. The stokers are operated by a standard B. & W. vertical enclosed 5½-in. x 5-in. engine, and the coal is carried to the hoppers in a car running on tracks and having a capacity of 1,000 pounds. The coal bunkers are at the side of the boiler room under the sidewalk level. The coal is weighed on a "Dormant" warehouse scale having a capacity of 2,500 pounds and supplied by the Canadian Fairbanks-Morse Co.

Two duplex 7½-in. x 5-in x 6-in. outside packed plunger pumps, fitted with pot valves, are installed for feeding the boilers. The pumps take water from the "Cochrane" heater to the boilers, and were supplied by the Smart-Turner Co., Hamilton, Ont. For emergency use there is installed a "Metropolitan" injector, single level pattern. The injector is fitted with a by-pass, so that city water can be used direct.

The "Cochrane" feed-water heater is rated at 750 h.p., its exhaust inlet and outlet being 12 in. diameter. The heater is fitted with five gravity return connections from exhaust steam heating system. It has a 6-in. connection for boiler feed and a 3-in. connection for discharging from traps. A pump and receiver are installed for collecting condensate from the live steam heater and returning same to the boilers. The pump is a 6-in. x 4-in. x 7-in. duplex type of "Smart-Turner" make. The outfit is equipped with a "Waters" type of governor valve and float, and water at 250 degrees can be handled. Two "Davis" 5-in. automobile stop and check-valves are fitted in the steam headers, one for the main engines and one for the auxiliary units.

The boiler blow-down tank is located at the rear of the boilers. It is 36 in. in diameter and 48 in. deep, with a 4-in. connection to the boilers and also to the sewers. A 4-in. vapor tube is connected

to the tank. This tube leads from the exhaust pipe and allows the steam or vapour to go from the tank to the heating system and also drains water from the steam-line. The exhaust steam main is 12 in. diameter and the main water-line for heating system is 10 in. diam eter.

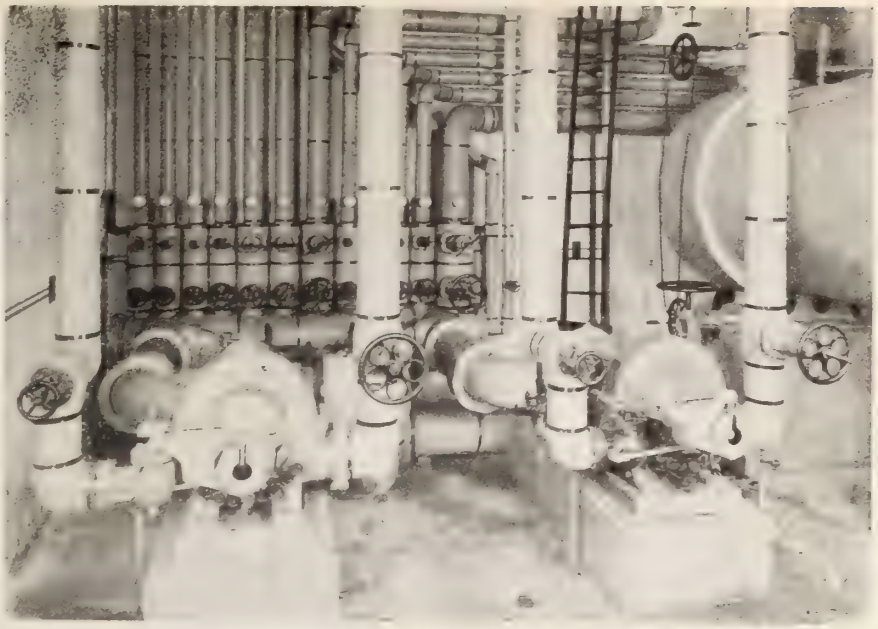
There are a number of steam traps installed; one "Davis" trap drains the steam headers and all steam heating coils for laundry and dry kilns. A "Davis" trap is also fitted to the service water heater, and the steam connections in the chemistry and physics laboratories are fitted with similar traps. The swimming pool heater is fitted with a trap. All high-pressure traps discharge to the feed water heater, and the exhaust pipe traps discharge to the sump through the blow-off tank.

Engine Room

The engine room has a bright and attractive appearance, the area occupied being 43 feet by 40 feet, and height of ceiling 20 feet. The flooring is of red Welsh tiling, and the side walls of white tile with white enamel finish above; a large mezzanine balcony accommodates the switchboard, and quarters for the engineers lead from same. The units installed are of different types and were selected to show the students the various kinds of machines in use at the present time. The steam plant is more than large enough to develop the necessary power for the motors and lighting systems, etc., but a very favorable rate was obtained from the Toronto Hydro-Electric Commission, so power from this source is largely used. The fact that the plant is larger than absolutely necessary for the power required is accounted for by the necessity of having the various units for demonstration purposes as well as for the actual development of power for the building.

The largest unit is a high-speed compound vertical enclosed, forced lubrication-engine built by the Goldie & McCulloch Co., Galt, Ont. This engine is rated at 365 h.p., and has cyclinders 16 in. and 25 in. diameter, by 10 in. stroke. The governor is of the combined throttling and cut-off type. The engine runs non-condensing and is specially designed for superheated steam. The cranks are set opposite to one another, and the reciprocating parts of the high and low pressure sides are carefully checked so that they weigh exactly the same. This arrangement practically balances the reciprocating parts and eliminates vibration at high rotative speed. The engine is direct connected on a common subbase to a 250 k.w. three-wire d.c., interpole generator, built by the Canadian Westinghouse Co.

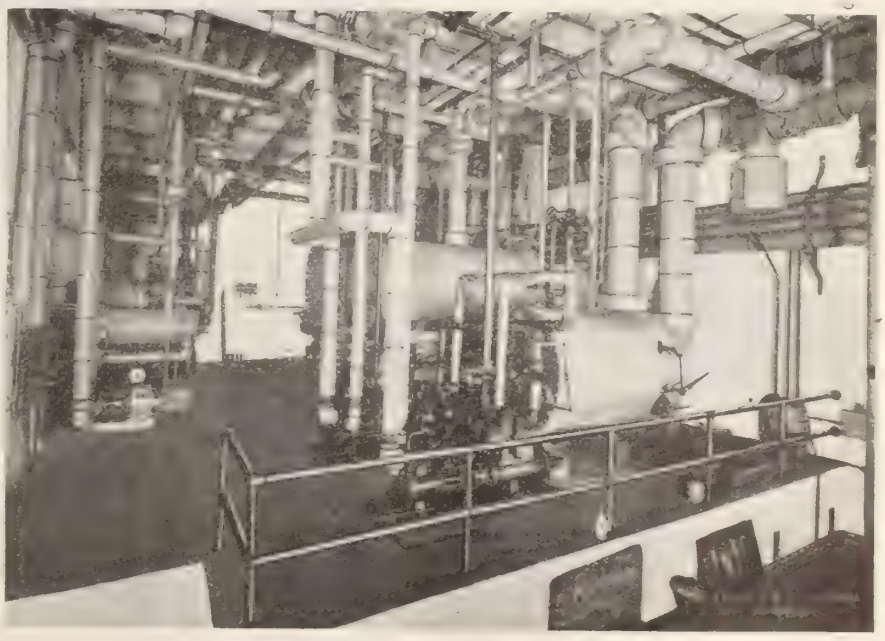
There is also a horizontal double eccentric Corliss engine built by the John Inglis Co., Toronto, Ont. The engine has steam dash pots, is rated at 150 horsepower, and has a cylinder 12 in. diameter by 24 in. stroke. It is direct connected to a 100 k.w., three-wire interpole d.c. generator built by the Canadian Westinghouse Co., Hamilton. The speed is 150 revolutions per minute. A smaller unit showing a type in common use consists of a single cylinder Goldie & McCulloch centre crank 10 in. x 12 in. "Ideal" engine. This runs under the same steam conditions as the other units and is rated at 75 horse-power, when running at 275 r.p.m. It is of the enclosed type with splash oil system. and is direct connected to a Canadian Westinghouse Co. 50 k.w. three-wire d.c. generator.



Forced hot heating appliances. To the right is shown part of the indirect heater mains and returns with pump electrically driven.

For converting hydro a.c. current to d.c., which is used throughout the building, a Canadian Westinghouse Co. motor generator set is installed. This unit consists of a 125 h.p. three-phase 550 volt. induction motor direct connected to a three-wire d.c., 110-230 volt, 3-wire generator with a capacity of 75 k.w., and running at 800 r.p.m. The starting mechanism for the motor generator is of Canadian Westinghouse Co. make, and is mounted on a white marble panel with an oil immersed auto-switch.

Compressed air for the shops and laboratories and for general use about the plant is supplied by an air compressor built by the Canadian Ingersoll Rand Co., Sherbrooke, Que. This compressor is a 10-in. x 10-in. x 14-in.



View of Hot Water Heaters, Re-heaters, Pumps and Filters.

straight line steam driven machine. It delivers 230 cubic ft. of free air per minute at 100 lbs. per sq. inch, when running at 180 r.p.m. The machine is fitted with an automatic regulator which can be adjusted to obtain any desired pressure. An interesting and somewhat unusual purpose this air compressor is put to is for the swimming pool. Air is blown up through the water in the pool, thus aerating it and driving any scum on top to the channel around the side. The air receiver is 36 in. in diameter, and 72 in. high.

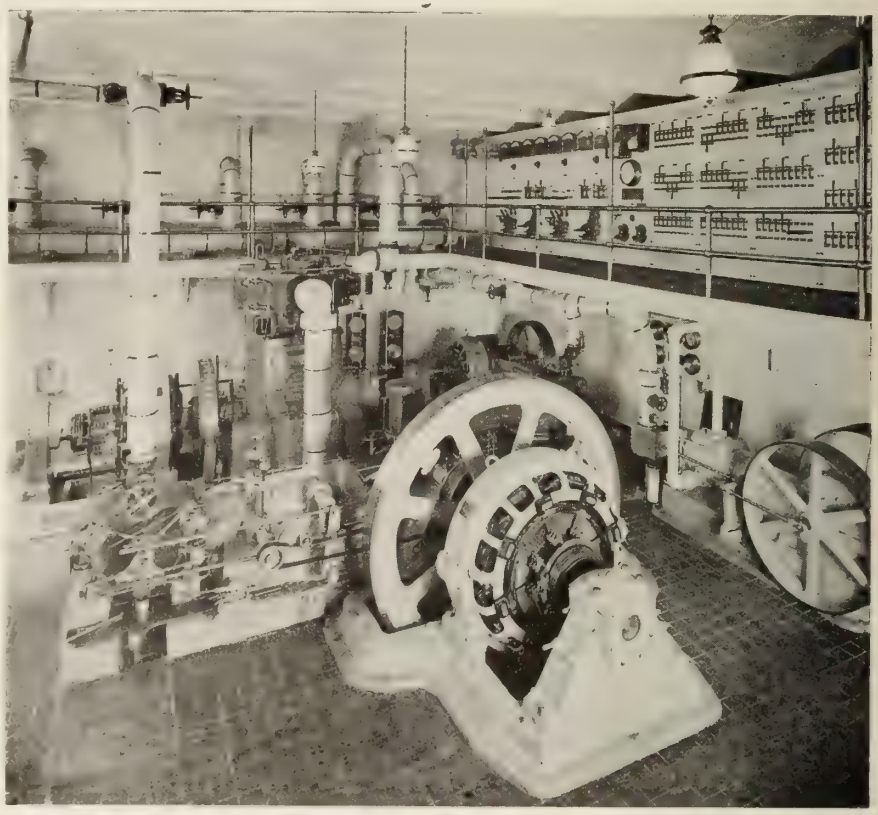
An ice machine is installed in connection with the refrigerator in the Domestic Science Department, for making can ice and for chilling the water supply to the drinking fountains. The ammonia machine has a capacity of 12 tons, and was built by the Frick Co., Waynesboro, Pa. It is a vertical two-cylinder machine, and is direct connected to and driven by a single cylinder horizontal steam engine with "Merze" valve gear. Calcium chloride brine is used, being circulated through the system by a centrifugal pump supplied by the Smart-Turner Co., Hamilton, Ont. The water cooling and can ice plants are in a small room adjoining the engine room. The can ice plant has a capacity of 200 pounds at one pumping.

Two Venturi meters are installed in the engine room of 3 in. and 10 in. sizes respectively. The former measures the water being used by the boilers and the 10-in. meter measures the water used in the heating system. The majority of the lubricators used in the plant were furnished by the Canadian Detroit Lubricator Co., Walkerville, Ont. The forced feed lubricator on the large Goldie & McCulloch engine was furnished by the McLeod Mfg. Co., Detroit, Mich. The covering for the high pressure pipes was supplied by the Canadian Asbestos Co., Montreal, Que., and is composed of 85 p.c. magnesia, and sectional, in two thicknesses. Over this is a layer of 8 lb. sheathing paper, and over that again is a covering of 8 oz. canvas. The pipe fittings are covered with 85 p. c. plastic magnesia and the flange joints with removable hinged covers to facilitate inspection. An oil separator is installed in the main exhaust pipe near the "Cochrane" heater.

A 12-in. "Swartwout" exhaust head fitted to the exhaust stack. It is of cast iron and is fitted with a 2½ in. drain. A 12-in. "Davis" automatic combination back pressure and relief valve is fitted in the base of the exhaust steam stack. A "Simmance-Abdy" combustion recorder is installed in the engine room. This apparatus is for testing flue gases and was supplied by the Precision Instrument Co., Detroit, Mich. The steam valves are of "Jenkins," "Chapman," and "Lunkenheimer" make. All the steam and hot water piping was supplied and erected by the General Fire Extinguisher Co., Toronto.

Switchboard

The main switchboard, which is an exceptionally fine piece of work is situated on a balcony along one side of the engine room. It was designed by the Canadian Domestic Engineering Co., Toronto, and installed by Keith's, Ltd., Toronto. The switchboard is 42 feet by 8 feet, and was designed to control 3-engine driven generators, one motor generator set and feeder circuits for light and power, both a.c. and d.c. The system is 120 volts d.c., and 3-wire, 550 volts 3-phase, 25 cycles for the a.c. service and branches.



View in engine room showing engines, electric generators and air compressors

There are 17 panels, Nos. 1 to 11 being for d.c., and 12 to 16 for a.c. service, and one totalling panel. The panels are made of white Italian marble 2 in. thick, each being built in two sections and supported on an angle iron frame work. There are two sets of bus bars, one carrying the current from the generators which are arranged with equalizer connections so that they can be run in parallel. The other set of bus bars carries the current from the motor generator set serving all the lighting and such power as may be required when the engines are not running. Double throw-switches are installed for this service.

There are four generator panels, each being equipped with I.T.E. double pole circuit breakers, a single pole knife switch for the neutral wire and a double pole single throw knife switch for the power wire. Each panel has two "Weston" ammeters and a field rheostat for controlling the voltage of the generators. The totalling panel in the centre of the board has one d.c. graphic recording "Westinghouse" meter for all the generators; one d.c. graphic recording "Westinghouse" watt meter for the motor generator set, and a clock which is connected with the clock system. There is also on this panel an integrating watt-hour meter, also "Westinghouse Columbia" type, 3-wire service for the motor generators. One rotary volt-meter switch is arranged so that the total voltage of any generator can be obtained, or voltage of either outside line and grounded neutral. There are two volt-meters mounted on a swing bracket at the end of the board. One is a single scale instrument connected to the bus bars, and the other a double scale instrument connected to the generators.

There are three light-distributing panels, each having nine triple pole, double throw knife switches. There are also two power-distributing panels. One of the latter has nine single throw triple pole switches and three double throw triple pole switches. The double throw switches control the elevators, machine shop, and some sections of the woodworking shop, so that these can be run by the motor generator or engines. The other power distribution panel has six

single throw, triple pole, knife switches and two double throw, triple pole, knife switches.

There are five a.c. service panels. One panel has a three-pole, single throw disconnecting knife switch at the back of the board for controlling the a.c. service. It has also a "Thompson" polyphase meter, and one "I.T.E." circuit breaker. The next a.c. service panel is for the motor generator. It has two "Weston" polyphase watt-meters of 30 k.w. and 100 k.w. respectively, and two "I.T.E." circuit breakers. Another a.c. panel is the frequency changer panel. This has a "Weston" a.c. ammeter, and ammeter receptacles for reading currents in any phase; one "Weston" ammeter for a.c. field; one "Weston" frequency meter, and a "Weston" volt meter. This panel has also a double pole single throw switch with discharge clips and resistance; a rheostat mounting, an eight-point potential receptacle with 4-point plug, and one 3-way ammeter switch on "I.T.E." circuit breaker.

Another a.c. distribution panel has three "I.T.E." circuit breakers. The circuit breakers are used instead of switches for a.c. distribution from the switchboard. All switches are provided with enclosed cartridge fuses, all current carrying parts are polished copper.

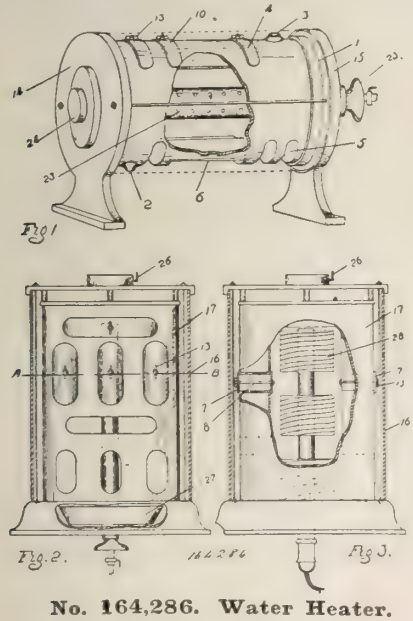
New Canadian Patents

No. 164,286.

Alph Pearce, Weston, Ontario, Canada, 10th August, 1915; 6 years. Filed 3rd April, 1914. Receipt No. 236,-778.

Claim.—1. In a water heater, a heater, an annular casing forming a water jacket around said heater and having walled in slots therethrough for the circulation of the hot air, and a shell surrounding said water jacket.

2. In a water heater, a heater, an annular casing forming a water jacket around said heater and having walled in slots therethrough, the upper ones of said slots being closed in at their outer sides, and a shell surrounding said water jacket.



No. 164,286. Water Heater.

3. In a water heater, a heater, an annular casing forming a water jacket around said heater and having walled in slots therethrough for the circulation of the hot air, the upper ones of said slots being closed in at their outer sides by covers adjustably tightened to their closed positions, and an outer shell and ends closing in said water jackets.

4. In a water heater, a cylindrical member having its walls of hollow formation and its heads rigidly supporting said walls, a heating member extending longitudinally and centrally within said cylindrical member extending through and fastened to said heads, and a shell rigidly secured to said heads and suitably spaced from said cylindrical member and communicating with the interior of said cylindrical member.

No. 165,031

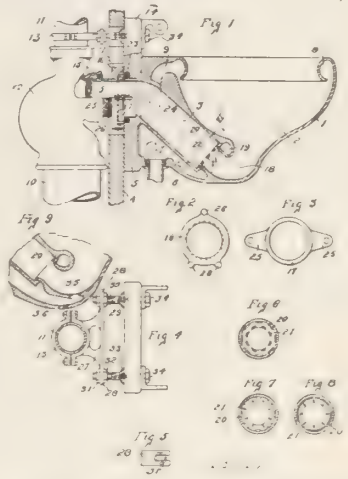
Ira A. Mann, Pittsburg, Pennsylvania, U.S.A., 21st September, 1915; 6 years. Filed 7th May, 1915. Receipt No. 251,509.

Claim.—1. In combination in a plumbing fixture, a bowl, an inclined discharge passage, inlet jet means opening into the discharge passage and encircling such passage and directed in substantial parallelism with the walls of the discharge passage at the periphery thereof, and other jet means opening into the discharge passage and directed obliquely with respect to the walls of the discharge passage.

2. In combination in a plumbing fixture, a bowl, an inclined discharge passage, an inlet jet means opening into the discharge passage and encircling such passage and directed in substantial parallelism with the walls of the discharge passage at the periphery thereof, and other jet means for supplying water longitudinally of the discharge passage but inside of the first-mentioned jet means and spaced away from the periphery of the passage.

3. In combination in a plumbing fixture, a bowl, a discharge passage having a reduced inlet portion leading downward from the bowl and then inclined upwardly, and a main portion of larger diameter than the inlet portion and inclined upwardly, the said portion merging into each other, an annular supply passage in the wall of the reduced inlet portion of the passage and extending around said portion, and jet inlet means leading through the wall of the discharge passage at the point where the two portions of the passage merge, the jet inlet means extending around the discharge passage and being directed in substantial parallelism with the walls of the said main portion of the discharge passage.

4. In combination in a plumbing fixture, a bowl having an annual flushing cavity around its upper edge, the inner wall thereof adjacent the upper portion of the cavity being provided with downwardly directed flushing means extending circumferentially of the bowl.



165,031. Plumbing Mechanism.

5. In combination in a plumbing fixture, a bowl having an annular flushing cavity around its upper edge, the inner wall thereof between the top and bottom of the cavity being provided with a series of downwardly directed flushing passages for directing the water in the inner wall of the bowl.

6. In combination in a plumbing fixture, a bowl having an annular flushing cavity around its upper edge, the inner wall thereof adjacent around its upper portion of the cavity being provided with downwardly directed flushing means extending circumferentially of the bowl, and the lower portion of the cavity being provided with an outlet leading into the bowl.

(Continued on page 34.)

Practical Course for Sheet Metal Workers

ARTICLE No. 30 OF SERIES

By CHARLES SEIVERS

IN this article is shown in the method to adopt in the cutting of pattern for an angle mitre and a butt mitre. Fig. 1, A-B-C-D, shows a plan of window or wall with moulding around same. At section is shown a full size of moulding or cornice; it will be required to cut the mitre for B or C and at A or D.

At Fig. 2 is shown at A-B-C-D a plan of the butt mitre at A or D, and at E-F-G-H is shown a plan of the mitre at B or C.

Mark off on this plan a profile or section of moulding shown at Fig. 1, keeping line marked wall line on the inner line of plan—that is, B-C or E-G.

Having done this, divide the curved sections of moulding into a number of equal parts, and from the angle of each plain or straight member of moulding and each section of curved member run lines parallel to B-C and A-H, extending them until they intersect mitre lines A-B and G-H.

To lay out pattern, draw a line as at K-L, and on its two ends erect lines, as K-M and L-N. On these lines, K-M and L-N, set off the spaces on section, as shown by 1-2-3-4-5, etc. When these lines have been set off, draw lines connecting points, 1-1, 2-2, etc.

At a convenient distance from K-M draw a line parallel to K-M, as shown by O-P. The line O-P must be used to set off distances from. Obtain these distances by measuring from line E-F, at Fig. 2, to the mitre line G-H, the distance on line drawn through point 1 being set off on line 1 at stretchout, from point 2 on line 2 on stretchout, and repeating on all remaining lines in a similar manner.

The accompanying article is No. 30 of a course of practical problems for sheet metal workers prepared, especially for the readers of The Sanitary Engineer, by a practical mechanic who is constantly in touch with new problems which are arising in the sheet metal trades. These articles are a regular feature in The Sanitary Engineer, the only paper published in Canada in the interest of sanitary and heating engineering.

When one line passes through two points, as 2 and 3 and 4 and 5, the distance from line E-F to mitre line is the same for both points.

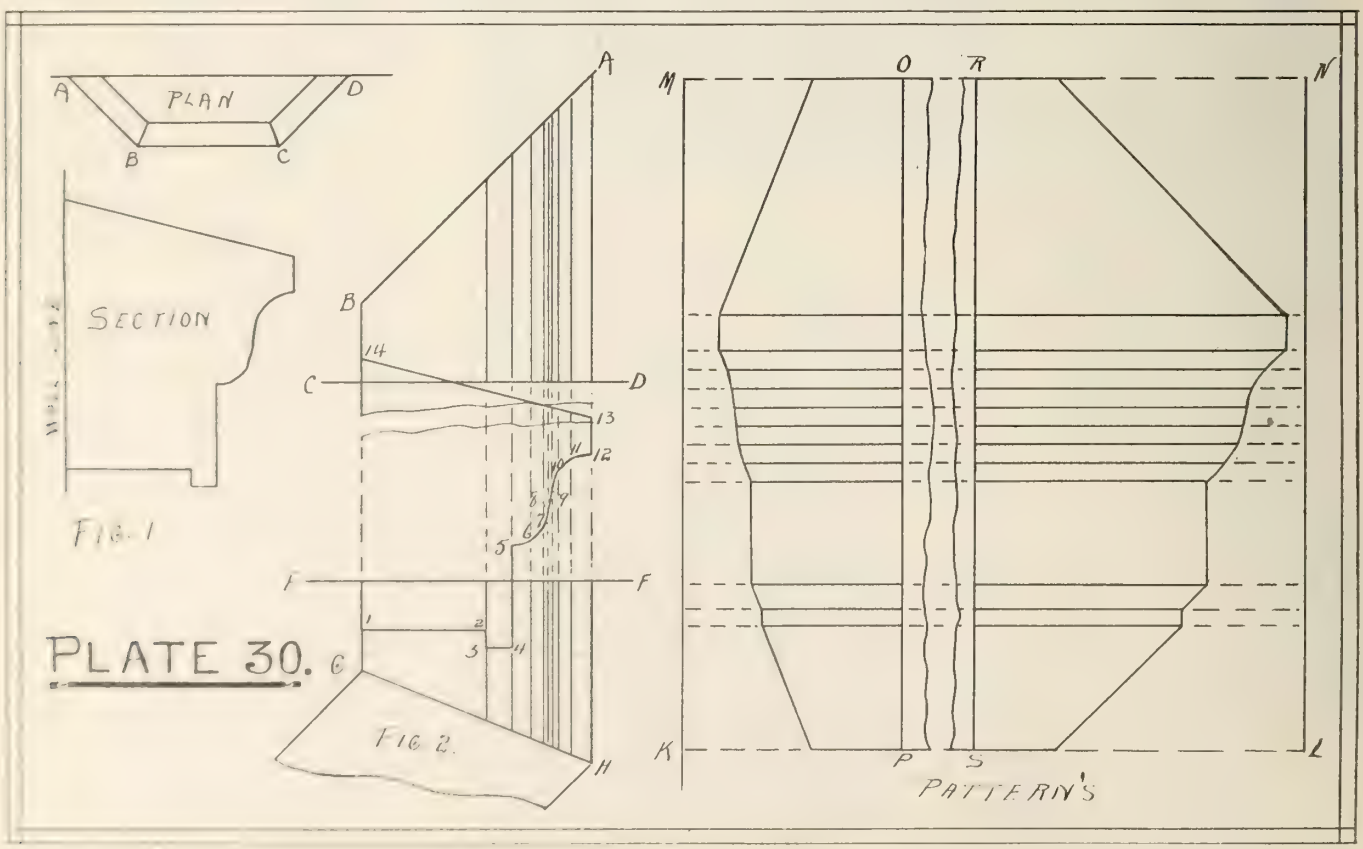
When all are measured and set off on stretchout, a line drawn through points obtained will give outline of pattern for mitre on line G-H, at Fig. 2, or at B or C, at plan in Fig. 1.

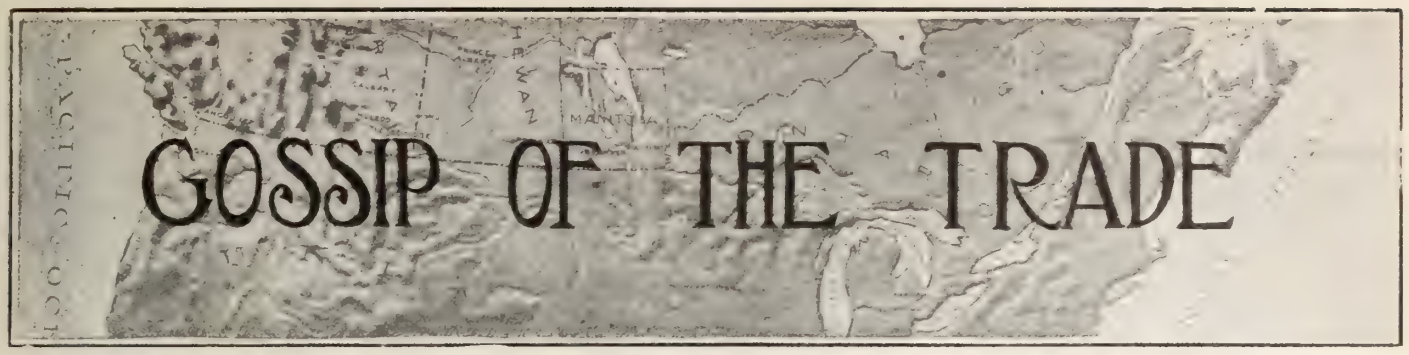
The other pattern is developed in same manner, measuring from line C-D to mitre line A-B, and setting off from line R-S on stretchout.

It will, of course, be seen by our readers that any form of moulding may be developed by adopting these instructions in a general way. It does not follow that each moulding requires a different method; the principles are the same.

(Continued in next issue.)

If you have plenty of enthusiasm you won't have to be urged to hustle.





CHANGE OF ADDRESS

The St. Catharines Chatfield Heating and Plumbing Co. have moved their office from 33 Ontario Street to their warehouse on Ontario Alley.

PRICE CUTTING

The only difference between a man who cuts his own throat and the man who cuts prices is this:—One commits physical suicide and the other business suicide.

ERECTING LAVATORY AT WEST TORONTO

Construction work has been commenced for the erecting of a lavatory for women on the civic property on Keele street near Dundas street. The contract has been awarded at a cost of $275.

ELECTED MEMBERS OF BOARD OF TRADE

The following men interested in the sanitary and heating engineering profession have been elected members of their local Board of Trade:—O. B. Mueller, Esq., president of H. Mueller Mfg. Co., Ltd., Sarnia, and R. Hawkins, Esq., of Smith's Falls, Ont.

GUELPH BOARD OF HEALTH NOW CONTROLS SANITARY WORK

The Board of Health has taken over control of the sanitary work of the town under a by-law passed some time ago. Mr. James Hewer, of Guelph, is in charge of the sanitary work and commenced his duties on February 21 under the supervision of the board.

NEW CATALOGUE

"Plumbers' Wood-work" is the title of an illustrated book of over fifty pages now being issued to the trade by The Becker Mfg. Co., Marietta, Ohio, U.S.A. The book contains a full description of their line of w.c. tanks, seats and combinations, and can be procured by writing to the above address.

NEW BUSINESS VENTURE

W. J. Webber, Port Alberni, B.C., has entered into the plumbing business. Mr. Webber is a first-class plumber and holds a master plumber's certificate. He was at one time a vice-president of the Canadian Domestic Sanitary and Heating Engineers' Association, and was formerly in the plumbing business at Summerside, Prince Edward Island.

STRATFORD SEWAGAE DISPOSAL PLANT O K.

Mr. F. A. Dallwyn, C.E. Provincial Sanitary Engineer, lately visited Stratford, Ontario, and together with city Engineer Manson, inspected the water pumping station and the sewage disposal plant.

A few minor alterations were recommenced but Mr. Dallwyn expressed himself as highly pleased with the existing conditions.

MOVED TO BRANDON

Mr. W. B. Perry, who for the past ten years, has held the position as Office Manager of the Standard Ideal Company, has resigned his position to accept a better one in Brandon, Man. Before leaving he was presented with a handsome leather club bag by his office staff, also a silk umberella by the Young Men's Brotherhood, of which he was teacher.

CLOSET SPECIALTIES

Above is the title of a very interesting and instructive booklet which is being issued to the trade by the H. Mueller Mfg. Co., Ltd., Sarnia.

It is highly illustrated and describes the large assortment of w.c. seats, tanks, valves, and other fittings which go into the make-up of complete w.c. combinations. Those desiring to procure a copy of this catalogue may do so by applying to the above-named company for their catalogue 1D.

A REAL NEED

What Canada wants to-day is an act of parliament which will prevent unbusiness-like nonentities starting in business on their own account.

They only demoralize business all round. It is far more essential that a man know how to run a business than it is that he know how to wipe a joint. He can learn to do the latter at his own expense. If he fails to learn he's the loser, but if he fails in business somebody else is generally the loser.

SHOULD CO-OPERATE WITH ONTARIO SOCIETY OF SANITARY AND HEATING ENGINEERS

One of the resolutions put before the members of the Ontario Retail Hardware and Stove Dealers' Association at their recent convention read as follows: "The committee would recommend that the O.R.H. and S.D.A. co-operate with the Sanitary and Heating Engineers' Association in endeavoring to secure a uniform plumbing by-law. We feel this would protect those in the legitimate trade, and also be a protection to the public."

TORONTO VISITOR

One of Ottawa's sanitary and heating engineers paid a visit to Toronto last week in the person of M. M. O'Connell, of O'Connell Ltd.

Mr. O'Connell for many years held the position of plumbing inspector in the Dominion's capital, and made friends of every practical man while in that capacity, though he was a "terror" to deal with if you tried to "put one over on him." No blind vents or cracked hubs could ever get past him those days and while the city of Ottawa is being well served by the present chief plumbing inspector, J. Jacques and his staff, all of whom are practical men, the name of M. M. O'Connell will long be remembered for the good work he did, and is still doing at the present day in the city of Ottawa.

COMFORT STATIONS

The following significant statement was made by Prof. Wm. T. Sedgwick, president of the American Public Health Association, in his presidential address at Rochester last September:

"The most flagrant failure in American sanitation to-day is the almost universal lack of public conveniences or comfort stations in American cities and towns. The stranger within the gates of most American communities seeks in

vain for any public sanitary conveniences. If he is well dressed he must be referred to hotels or other semi-public buildings, or if poorly dressed, to saloons or railway stations."

This is a problem that requires very serious consideration by the people of Toronto. The Toronto city fathers just at this time are squabbling about parks, etc., and are advocating an extra tax of one mill for the purpose of providing parks. Why not raise the money for public comfort stations, and make them monuments of beauty as well as comfort?

THE COST OF CARELESSNESS

The latest revised figures show the fire loss in the United States and Canada last year was $182,836,200. This is a big drop from 1914, and is due largely to the more intelligent, modern way of fighting fire at the start.

Look at this table. You had to pay your share of these losses:

1915	$182,836,200
1914	235,591,350
1913	224,728,350
1912	225,320,900
1911	234,337,250
1910	234,470,650
1909	203,649,200
1908	238,562,250
1907	215,671,250
1906	459,710,000
1905	175,193,800
Total for 11 years	$2,630,091,200

The above figures prove that every man, woman and child in Canada and United States has paid over $2 a year for fire losses.

STEAM POLLUTION

Serious Conditions Due to the Discharge into Them of Untreated Sewage

Sewage and sewage disposal is dealt with thoroughly in a report on "Water Works and Sewerage Systems in Canada," to be published shortly by the Commission of Conservation. The gravity of the problem of stream pollution in Canada is shown by the great number of our inland waters receiving [illegible]. Particularly is this the case in the eastern portion of the Dominion. In the west we have the excellent example of the Province of Saskatchewan where 80 per cent. of the sewerage systems have treatment [illegible].

The supply of water to communities [illegible] as the most important function of inland waters. If these waters are allowed to become polluted, they constitute a grave menace to public health. This may be the case even where filters are employed, as a grossly polluted source of supply may overload the filter, which latter should only be regarded as an additional safeguard in an operation which should begin with the proper treatment of the sewage before it is discharged into any body of water.—L.G.D.

TORONTO SOCIETY EXECUTIVE HOLD IMPORTANT MEETING

A meeting of the executive committee of the Toronto Society of Domestic Sanitary and Heating Engineers was held in their permanent offices 22 College street, Toronto, on Thursday, February 24th. The chief matter under consideration being that of a proposal now before the Toronto City Council to place the inspection of plumbing and sanitary engineering construction in the hands of the city architect.

For some unknown reason or other the M. H. O., Dr. Hastings, takes the stand that plumbing is not a matter which should come under the powers of the Health Department.

The city architect's department are doing all in their power to have this department put under their care, and the health department wishes to dispense with the plumbing department management.

The Toronto society discussed the question in a very fair, free and unbiased manner from every angle, but could not see how the citizens could be better served, or the plumbing inspection department improved if it is put under the jurisdiction of the city architect.

Not having heard any concrete reason why the M.H.O. desired the change, or why the city architect was willing to assume the control of such an important matter the meeting resolved that a special committee be formed to wait upon the medical health officer and the city architect with a view to ascertaining the reason for the proposed change. The committee will be composed of the following gentlemen:—R. J. Shannon, F. R. Maxwell, L. Legrow, Geo. Clapperton, John W. Bruce, of the Plumbers' and Steamfitters' Union, and Edwin Newsome, editor of The Sanitary Engineer.

"SOLDIER NIGHT"

The bugle sounded promptly at 8.15 p.m. on Wednesday, February 16, at the rooms of the Toronto Society of Sanitary and Heating Engineers, and the rally was a success in both numbers and inspiration.

The guests of the evening were Major D. F. Keith, of the 75th Battalion; Sergeant-Major R. G. Henderson, of the 134th Battalion; Lieutenant G. A. Keith, of the 170th Battalion, and Sergeant George Kirtley, of the York Rangers—all of whom were recently engaged in the sanitary and heating business.

During the evening Lieut. G. A. Keith, of the 170th Overseas Battalion, addressed the meeting, and explained a very novel scheme of recruiting, which is bringing good results. Details of this scheme were published in the last issue of The Sanitary Engineer. No doubt as a result of this splendid address quite a number will respond.

It might however, be mentioned that while this appeal was made in this way, it must not be thought that sanitary and heating men have not done their bit.

As a class of mechanics it is very doubtful whether the sanitary and heating engineers have not furnished more men than any other skilled mechanics in Toronto.

As an illustration, we cite a few names of the firms who have lost men from their staff.

F. R. Maxwell & Co.	17 men
Bennett & Wright	43 men
Purdy & Mansell	55 men
Keith's Ltd.	33 men
Fred Armstrong, Ltd.	35 men

And it is estimated that the Toronto craft alone have furnished upward of 2,500 men.

The hope is that a majority of these men will return safe and none the worse for their experience.

H. MUELLER MFG. TO BUILD NEW OFFICE BUILDINGS

The H. Mueller Manufacturing Company are having plans prepared for a new office building to be built at the north end of their property, overlooking the river. The building will be 60 x 60 feet, two or three stories and basement and modern in every sense of the word.

At present the company has several offices in different parts of the plant, which by the new arrangement will all be placed centrally.

A telegraph connection has been established this week and recently a telephone switchboard was put in to connect all the departments.

The new arrangements will include a board room, executive offices, treasurer's office, purchasing department, auditors' rooms, reference department and everything that tends towards convenience and efficiency.

A dining room for the office staff will be incorporated in the new scheme.

The present office rooms will be added to the shipping room by the removal of the partitions.

EXTENSION TO FACTORY

The National Equipment Company, Toronto, Ontario, are building an extension to their factory estimated to cost $17,500.

Canada Metal Co. Sales Convention

President of Company Refers to Bright Outlook for 1916 Business—Winners of Competitions—Subjects Discussed at Convention Meetings—Value of Staff Conventions.

THE fourth annual convention of the sales staff of the Canada Metal Co., Ltd., was held at Toronto last week. The business of the past year was reviewed, and plans outlined for the future.

W. G. Harris, Sr., president, delivered an address of welcome, and spoke of the satisfactory results attained during 1915. Mr. Harris described how at the beginning of the year contracts had been received from the Government for bullets, and while it was a new line to commence with, it required efforts to deliver two or three tons a day, yet by the end of the year the capacity was one hundred tons per day. This, Mr. Harris merely mentioned to illustrate what could be accomplished by sticking to it.

Continuing, he stated that there was every indication that 1916 would see the greatest revival in trade conditions that Canada had known. First of all in looking at our own results, said Mr. Harris, in January the best report for any one month during the last four years was presented, and more business booked up for future deliveries than ever before.

The Roll Call

Twenty-two answered the roll call. The vice-president of the company, W. G. Harris, Junior, presided, and in his address of welcome referred to the pleasure it was for all to meet once more under such favorable conditions after a strenuous year. He congratulated all upon their success, for independent of war contracts the results for general sales for 1915, made the year stand out as the biggest and best in the firm's history. Mr. Harris said in part: "The year opened out under very unfavorable circumstances, yet everyone set out with the determination to make good and this determination was crowned with success, and when we begin to ask what are the prospects for 1916, indications are that it will be a bumper. The reasons are easily seen when we know that merchants everywhere tell us that business is booming. Farmers have had a record crop, at big prices, with big demand at home and abroad. Stocks of manufactured material are short, and labor is in great demand. Exports largely exceed imports. Factories are busy, a great many working overtime. More freight cars are needed, and steamers are taxed to capacity. Canada, has, in proportion to population, greater exportable surplus of wheat this year than any other country in the world. Millions of dollars are passing over the merchant's counters."

Winners of Competitions

The first session was taken up with a review of the sales for 1915, and presentations to the winners of the various competitions. S. Prevost was the winner of the gold watch and chain, value $150, which is the first prize for Harris Heavy Pressure Babbitt Metal sales. The presentation was made by Mr. Harris, Sr., who said that it was a year of many surprises, for in March the sales for H.H.P. were 25 per cent. above the record of April, 1913, and along came June with another record of 20 per cent. above March, and again December 30 per cent. above June. The year 1916 was opening out with promises of trade expansion and brilliant prospects and pretty tall records had to be beaten.

In making the presentation, Mr. Harris said it was a great pleasure to see such a close finish, and on presenting the second prize, a cheque for $25 to Mr. Matthews, he wished him better luck next time.

Another pleasing feature noted by Mr. Harris was that during 1915 every salesman had been successful in winning at least one competition.

Subjects Discussed at Convention

Tuesday was a day of discussion and papers were read on various subjects, such as the rolling of sheet lead, its possibilities and the advantages of rolling to small sizes to assist the hardwareman. Demonstrations were given in the sheet lead rolling department, so as to give the salesmen a practical knowledge of the various processes.

Another interesting paper was given upon "How I make an agent and assist the hardwareman to make a connection for babbit metals.

Another which was well received and was full of useful information. "How I assist the hardwareman who carries plumbers' supplies."

This brought out another interesting discussion upon the subject "What is a Salesman. His duty to his firm and his relation to the customer?" This was concluded by one of the Western representatives reading the following:

What Is a Salesman?

When your train pulls in and you grab your grip,
And the hackman's there with his frayed-out whip,
And you call on your man and try to be gay,
And all you get is "Nothing doing to-day!"
You're a peddler—
By gad, you're a peddler!

When you get in town and call on your man,
"Can't you see any, Bill?" "Why, sure I can."
You size up his stock, make a rough count—
"Bill" presently says, "Send the usual amount!"—
You're an order-taker;
By gad, you're an order-taker!

When you travel along and everything's fine,
You don't get up until half-past nine,
You see each concern and talk conditions,
Then write it all home with many additions,
You're a traveling man—
By gad, you're a traveling man!

When you call on your trade and they talk "hard times,"
"Lower prices" and "decided declines,"
And you talk and smile, make the world look bright,
Then send in your orders every d——d night,
You're a salesman—
By gad, you're a salesman!

—By G. A. McG...

One day was taken up in outlining and discussing competitions for the ensuing year. The company put up $1,500 to be competed for, and the competitions, which H. C. Crow first inaugurated nearly five years ago have proved both interesting and successful. For 1916 a few specials are offered which give every salesman an opportunity to prove his ability in some special line.

Friday was confined purely to the western trade and dealing with the exceptional conditions which have arisen in the West.

Luncheon was served daily in the new dining hall in the factory. Each day an inspection was made of the new showroom and of the various departments which have been added during the past year. Practical demonstrations were given illustrating the manufacture of brass goods by taking the ingot metals to the brass foundry and after being cast in the brass foundry taken to the brass finishing department. Salesmen were shown the various processes from ingot metals to finished products. Each department was treated in a similar manner.

In concluding the convention, Mr. Harris, Jr., referred to the benefits of conventions for salesmen. Conventions promote good fellowship, and give the salesmen a better knowledge of the factory and the goods manufactured. Mr. Harris referred to the great possibilities which will continue to exist during 1916. Mr. Harris advised the salesmen to plan their work carefully and to remember that a man is paid for what he finishes, not for what he starts.

WILL REBUILD

The A. B. Jardine Company, Hespeler, Ont., are rebuilding their plant which was recently damaged by fire.

ADDITION TO PLANT

The Steel Company of Canada, Montreal, Que., will build an addition to its plant here to cost $24,000.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

CAN A GAS WATER HEATER BE USED?

Editor The Sanitary Engineer:

I have been asked to install two radiators in two rooms situated at the rear of a long building.

The building is heated now by hot water, and has been enlarged twice already, thus taking up all the surplus heating capacity of the boiler. The additions to the building were also made at the rear each time, which causes the boiler to be almost at the opposite end of the building to where the two rooms are now situated.

Do you think it would be possible to install a gas water heater to do the work? If you do, will you show how this could be done?

Additional Heat

In Fig. 1 the layout is shown of a gas water heater installed to heat two raditors. It is equipped with a thermostat which can be regulated to maintain the desired heat in the rooms.

The usual care should be taken when installing such a system that all pipes have the same pitch. Pipes should be all reamed or cut without burrs and if possible long sweep fittings should be used, so as to overcome all friction possible.

Provisions should be made to drain the water off at the lowest point in the system. The heater should be connected to the system by the use of two bronze to bronze unions.

There are quite a number of ways by which a gas water heater can be installed to suit various conditions and if those interested in heating would consider the gas water heater when either installing additional or auxiliary heat, the gas water heater would no longer be considered as an appliance suitable for sale only in the spring.—Editor.

Why So Much Tile Pipe

Editor The Sanitary Engineer:

In the articles you published some months ago referring to septic tanks and small sewage disposal plants, you said that for every cubic foot of sewage to be flushed or syphoned at one discharge of the valve or syphon, not less than 13 or 14 feet of 4 in. tile pipe should be used. I have read other authorities who differ with you on that point, and I would like to know why you consider we should allow so much. It

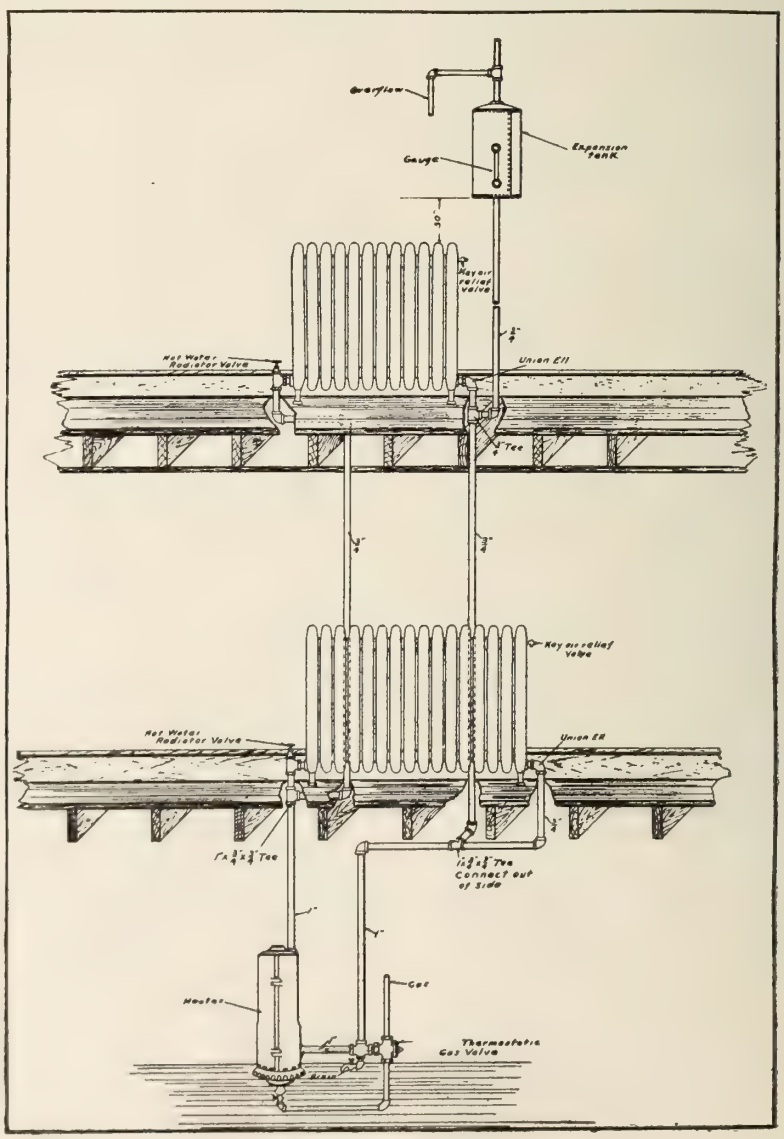
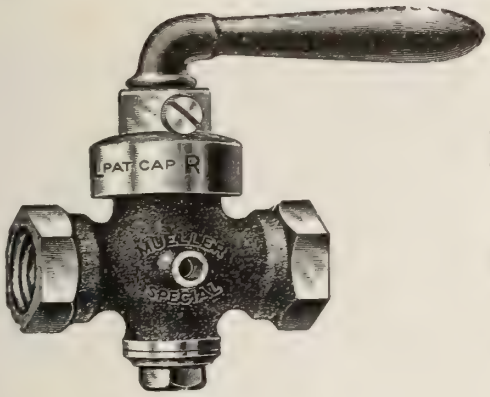


Fig. 1. Showing how additional heat may be furnished by the use of a gas water heater

Quality TRADE-MARK MUELLER REGISTERED Service



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MUELLER

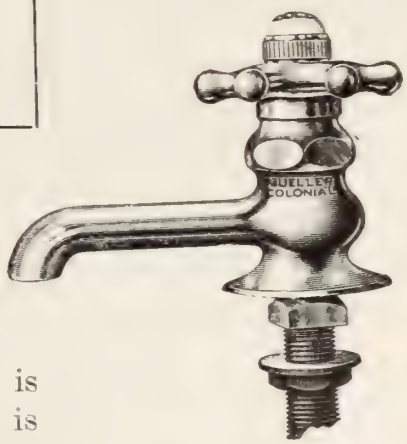
No. 49 Stop and Waste Cock

GROUND KEY WORK

Mr. Sanitary Engineer, can you mention any piece of goods which requires to stand more real abuse than a stop and waste cock?

It is installed in the most important portion of the plumbing system and may not be operated for years. It is then called up at a minute's notice to "stop and waste" the whole system.

Mueller Brass Goods throughout are made of the best virgin metal money will buy. **Mueller Brass Goods** are the results of 58 years of practical experience. We test every piece before it leaves the factory to a pressure of 200 lbs. per square inch.



12902—Patented

MUELLER

Colonial Self-Closing Work

Mueller Self-closing Work is second to none. It is built upon scientific principles in every detail. It is beautiful in design and, like every piece of brass goods we make, is **unconditionally guaranteed.**

Made in Sarnia, Canada

H. Mueller Mfg. Co., Limited

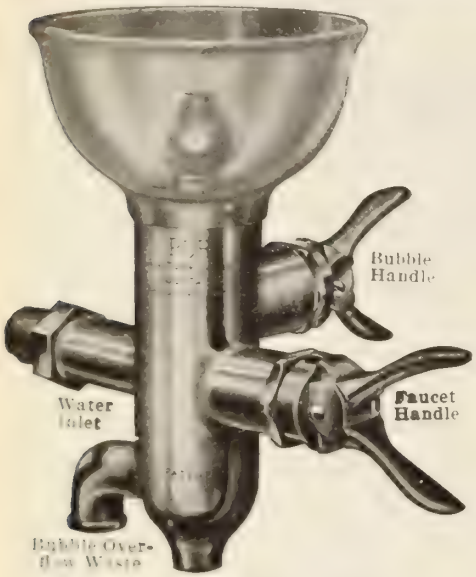
Sarnia, Ont., Canada

Makers of High-Grade Water Plumbing and Gas Brass Goods

PURO

(MADE IN CANADA)

Don't Pay Good Money for Impractical, Unmechanical and Often Worthless Fountains



Actual Size 7" High.

Here is a practical Fountain, which combines the Faucet and Bubble Features—takes care of the overflow waste, and insures

Safety and Service

The use of sanitary plumbing and the Sanitary Drinking Fountain is one of its important conditions.

SAFETY FIRST PURO SERVICE ALWAYS

In case of heavy brass with extra heavy nickel plate. Bubbler easily controlled by separate valve. No spurts—no choking—inside regulation prevents "showerbath." Faucet is controlled by another squeeze handle. Faucet gives full water pressure. Has thread for nose if wanted.

Write us the number of your employes and water pressure and we'll present an interesting proposition to you promptly.

Puro Sanitary Drinking Fountain Company

147 University Ave., TORONTO, CAN.

means such a lot of digging and cutting up, in many cases, of a good lawn. A reply will be appreciated in an early issue of your valuable journal.—Subsurface Tile.

Our correspondent is correct in stating that figures quoted by The Sanitary Engineer regarding this matter differ somewhat with some other authorities. The basis we adopt (13 to 14 lineal feet of 4 inch tile pipe is this:—The cubic contents or space in 13 feet of 4 inch pipe is approximately 1 cubic foot.

Syphons discharge at a very rapid rate, for instance a 3 inch syphon discharges at the rate of 90 gallons per minute and this discharge must have some place to discharge into.

These pipes should not be filled up to the top or there is a chance of creating back pressure upon the syphon or valve.

Another reason why such a quantity of subsurface tile pipe is recommended is that, providing the dosing chamber is discharged every 24 hours, the ground in which this pipe is buried is not being called upon to take care of too much liquid. It is always best to be on the safe side in matters of this kind. The writer has seen cases where a farmer was advised by a would-be expert to install 120 lineal feet of 2 inch field tile pipe to take care of 20 cubic feet of sewage. Needless to say the ground became water soaked and all the pipes had to be dug up.

We heard recently of a sanitary engineer refusing to install such a job, and by so doing losing a nice contract. This may be so, but we would emphasize our opinion that no chances should be taken in such matters; they are of too vital a nature.

In another part of this issue there appear two installations which are not in accordance with sound practice. We give our reasons for publishing these particulars.—Editor.

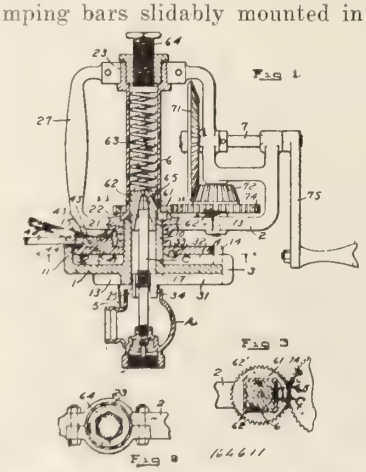
NEW CANADIAN PATENTS

(Continued from page 27.)

No. 164,611.

Thomas McLarty and James E. Gillis, Co-inventors, both of Eburne, British Columbia, Canada, 31st August, 1915; 6 years. Filed 23rd June, 1915. Receipt No. 253,191.

Claim.—1. In a valve grinder, means for clamping and centering the grinder upon a valve casing comprising a disc having a plurality of radial guides, clamping bars slidably mounted in said



No. 164,611. Valve Grinder.

guides, means for simultaneously sliding said bars in or out in the guides, and fingers on said bars adapted to engage the casing, to thereby clamp and center said grinder upon the valve casing.

2 In a valve grinder, means for clamping and centering the grinder upon a valve casing comprising a disc having a plurality of radial guides, clamping bars slidably mounted in said guides means for simultaneously sliding said bars in or out in the guides, means for securing said bars in adjusted position, and fingers on said bars adapted to engage the casing, to thereby clamp and center said grinder upon the valve casing.

3. In a valve grinder, means for clamping and centering the grinder upon a valve casing comprising a disc having a plurality of radial guides, clamping bars slidably mounted in said guides, means for simultaneously sliding said bars in or out in the guides, and a finger depending from each of said bars and adapted to engage the inner peripheral surface of the opening in the valve casing through which the stem projects, to thereby clamp and center said grinder upon the valve casing.

4. In a valve grinder, means for clamping and centering the grinder upon a valve casing comprising a disc having a plurality of radial guides, clamping bars slidably mounted in said guides, means for simultaneously sliding said bars in or out in the guides and a finger depending from each of said bars and adapted to engage the inner peripheral surface of the opening in the valve casing through which the stem projects, to thereby center said grinder to the valve casing, and a flexible member secured to said disc and passing about the valve casing, to thereby secure the grinder upon the valve casing.

REMOVING TO LARGER PREMISES

A. E. Barrington, sanitary and heating engineer, 1000 College street, is moving to larger premises on March 1st, the new address will be 970 College street. Mr. Barrington is a progressive man, and is doing a very nice business; he believes in digging up work. He took over the business of Messrs. Barrington & Christie some time ago and now enjoys the confidence of quite a number of patrons.

BUSINESS CHANGES HANDS

W. J. Milton has disposed of his plumbing business at 656 Talbot street, St. Thomas, to John McKenzie. Mr. Milton has purchased the general store of E. P. Boughner at Talbotville, and will take immediate possession.

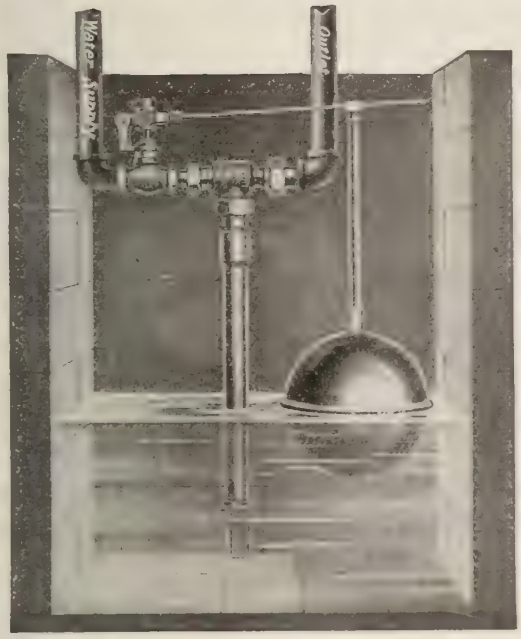
BOILER FAILURES UNDER HYDRAULIC TESTS

(Continued from page 14.)

This would also appear to be a case of internal deterioration of the material due to fatigue.

In both the foregoing instances the hydraulic test was applied for the purpose of revealing any hidden defects, and in each case the pressure at which the boiler failed was less than half the calculated bursting pressure.

MORRISON
Automatic Jet Pump



Just what is needed for use in draining cellars, engine rooms and excavations. Simple and durable.

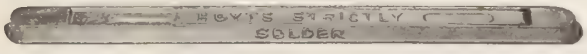
Has double the lifting power of any other cellar drainer made.

Working parts all above water.

These outfits have been in continuous successful service for upwards of two years, without requiring the slightest attention.

The James Morrison Brass Mfg. Company, Limited
93-97 Adelaide St. West, TORONTO

Our Mixed Metal Sales Amount to Over $5,000,000 Annually



We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO
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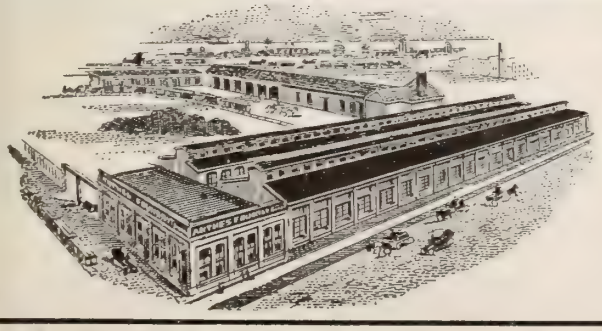
TORONTO **ANTHES FOUNDRY LIMITED** WINNIPEG



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ALPHABETICAL LIST OF ADVERTISERS

Occasionally advertisements are inserted in the paper after the index has been printed. The insertion of the Advertiser's name in this index is not part of the advertising order. The index is inserted solely for the convenience of the readers of the paper.

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Amherst Foundry Co. ..... Inside Front Cover
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Canadian Morehead Mfg. Co. 6
Canadian Tube & Iron Co. 37
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World-Famed Specimens of the Age of Steel

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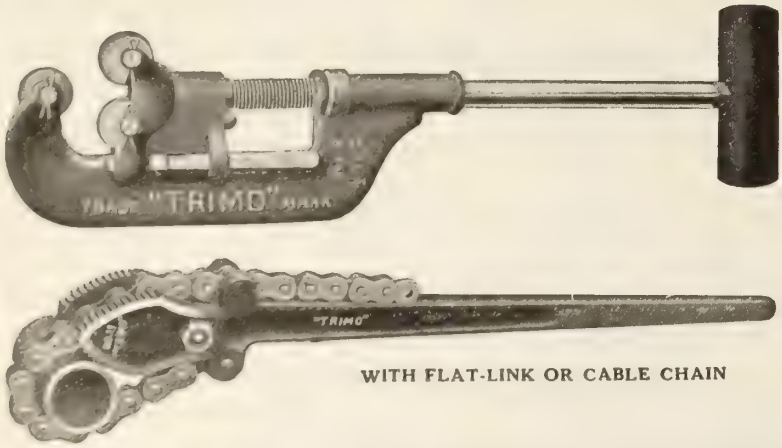

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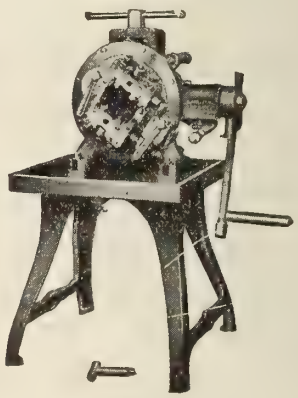
WITH FLAT-LINK OR CABLE CHAIN

Send for Catalog No. 91

MADE BY

TRIMONT MFG. CO., 55 Amory Street, Roxbury, Mass., U.S.A.



No. 00

PIPE MACHINES

Either Hand or Power

This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
A time and labor saving machine.

Manufactured by

THE ARMSTRONG MFG. CO.

317 Knowlton Street
BRIDGEPORT, CONN.
WRITE FOR CATALOGUE

Hotstream
HEATS IN A HURRY
WATER HEATER

The most complete line of high-grade tank heaters made in America. Capacity from 30 to 200 gallons.

Write for catalogue and calendar.

The Hotstream Heater Co. - Cleveland, Ohio

Condensed Advertisements

FOR SALE

PLUMBING, HEATING AND TINSMITHING business for sale in the best town in Western Ontario. Will reduce stock to suit purchaser. Reply to Box 98, Sanitary Engineer. (6)

WROUGHT PIPE

BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

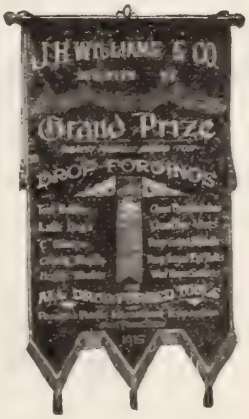
Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED
Montreal Works: Lachine Canal

Williams' Improved "Vulcan" 2 in 1 Chain Pipe Wrench
Economy=

Safety
+2 to 1 life
+first cost saving
+continuous service

Winners of the Grand Prize at P.-P.I.E.



J.H. WILLIAMS & CO.
77 RICHARDS STREET BROOKLYN, N.Y. CITY
THE WRENCH PEOPLE

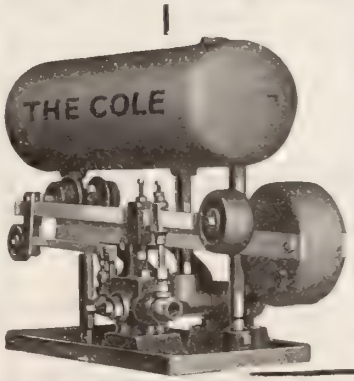
R. O. WYNNE-ROBERTS

Consulting Sanitary Engineer

310 TEMPLE BUILDING, BAY STREET
TORONTO

Water Supply, Sewerage, Sewage Disposal of Cities, Villages and Institutions.

COLE DIRECT RETURN TRAPS



Are big fuel savers because they operate on 1-10th the steam that it takes to run a steam pump.

They work with the utmost in efficiency and reliability, and return condensation at any pressure.

Operate on roller bearings, on a fixed Fulcrum which permits of full discharge at each operation.

Mr. Steamfitter, why not get in touch with US?

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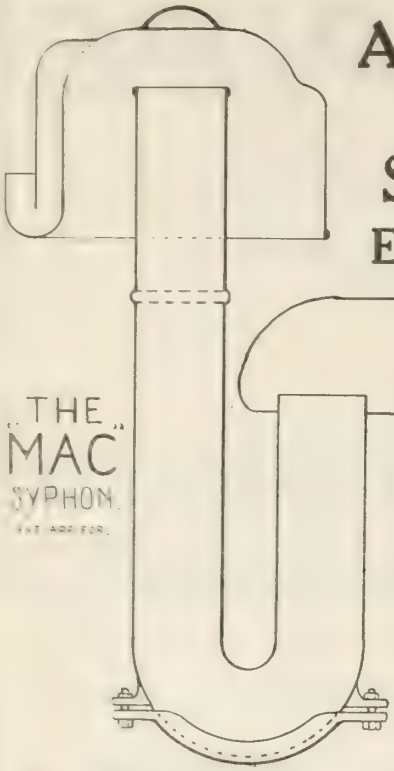
838 Dundas St., TORONTO



A Syphon that Syphons Every Time

You can't build one from soil pipe and fittings for the price we charge.

We make all kinds of Cast Iron Soil Pipe and Fittings.

Write us for prices.

West Toronto Foundry Co.

Cor. of Mulock and Junction

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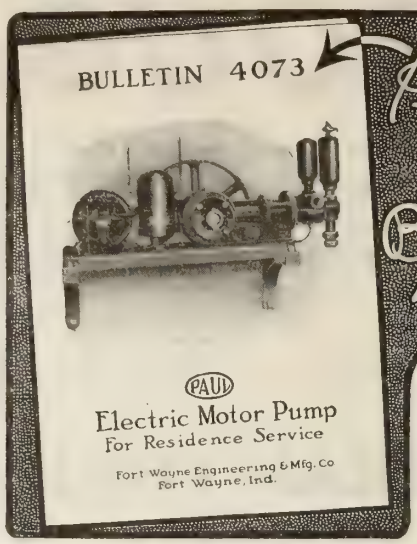

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It Tells All About the PAUL

ELECTRIC MOTOR PUMP

Mr. Plumber:—

Here is a perfect, low-priced electric motor pump adapted to all the requirements of the moderate priced home. Easy to install—noiseless—economical. **There's money in it for you if you push this pump.**

Give us your port of entry and we will quote you a price delivered to that point.

Fort Wayne Engineering & Mfg. Co. (Dept. S)

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Guaranteed Five Years.

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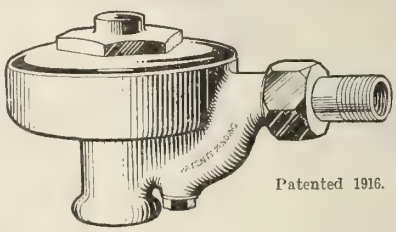

Patented 1916.

Clark Vacuum Return Line Valve

Possesses all the points of merit that any of its competitors have

PLUS

Its own points of superiority which makes it the best trap in the market.

IN ADDITION. IT IS

MADE IN CANADA ONLY

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C. A. Dunham Co., Ltd., Toronto.

Air Valves.
Canadian Wolverine Co., Ltd., Chatham.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.
C. A. Dunham Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
Jenkins Bros., Ltd., Montreal.
Kerr Engine Co., Ltd., Walkerville.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Asbestos Goods.
James Morrison Brass Mfg. Co., Toronto.

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Trimont Mfg. Co., Roxbury, Mass.

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B. O. T. Manufacturing Co., Toronto.
Cluff Mfg. Co., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

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National Equipment Co., Limited, Toronto.
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Kerr Engine Co., Walkerville.

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H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
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H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

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Harris Construction Co., Ltd., Montreal.
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James Morrison Brass Mfg. Co., Toronto.
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Trimont Mfg. Co., Roxbury, Mass.

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Canadian Tube & Iron Co., Ltd., Montreal.
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James Morrison Brass Mfg. Co., Toronto.
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National Equipment Co., Ltd., Toronto.

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Canadian Wolverine Co., Ltd., Chatham.

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James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
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Trimont Mfg. Co., Roxbury, Mass.

Pipe Joint Compounds.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

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Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
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Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.
A. B. Jardine & Co., Hespeler.

Pipe Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

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Amherst Foundry Co., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

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Cluff Bros., Church St., Toronto.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.
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Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.

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will convince almost anyone that an article is good. We cannot take one of our outfits to your shop and show you the good points; the best we can do is to show actual photos of outfits which we have installed and which are giving the best of satisfaction.

You can't afford to overlook the good points of our water systems. We think they are the simplest and most durable on the market. We have built up a very good reputation on them and we will help you on to do the same. It will be an easy matter if you install only

TORONTO Water Service System

This cut shows the residence of Mr. Geo. F. Legg, in Mimico, Ont., and also shows the outfit that supplies his family with both hard and soft water. The whole job is handled by one pump and one regulator, and is giving excellent satisfaction. If you have a similar proposition, send us a line and we will have our salesman call and assist you in laying out the job. At the same time just mention that you would like to have some of our circulars for distribution and they will be mailed at once.

Ontario Wind Engine & Pump Co., Limited

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The Safe Mercury Seal

The Honeywell Heat Generator—the only perfectly safe device for sealing a hot water system. No springs, weights, valves or movable parts—nothing but two open tubes joined at the bottom through which mercury and water circulates.

Dependable

It is absolutely impossible to stick or create more than ten pounds pressure in the Honeywell Generator. It gives perfect satisfaction under all conditions, and can be used for either old or new work.

Write for booklet "How to Properly Design and Install the Honeywell Method of Hot Water Heating." It is free.

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Manufacturers of High-Grade Heating Specialties

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DART Union Pipe Coupling

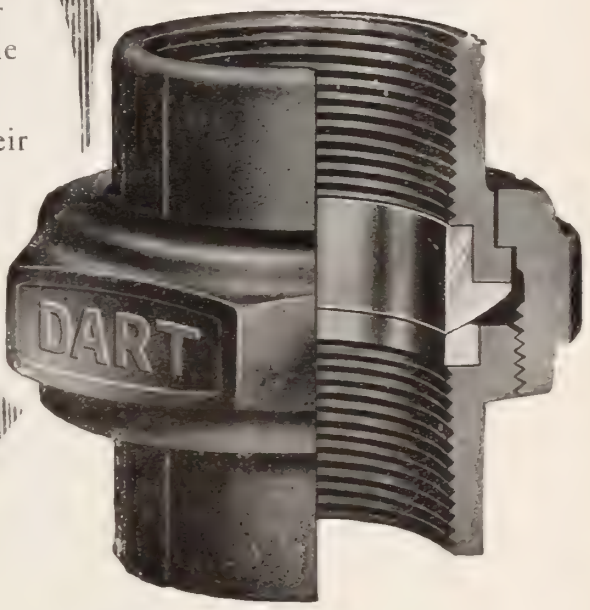
The kind that leaves no room for complaints and saves time

BRONZE to BRONZE at the Joint

You'll never be called back to right a leaky joint at your own expense if you use the Dart Union Pipe Coupling.

When once made tight they stay tight because their faces are of bronze which, you know, **cannot rust or corrode,** and the extra heavy iron parts will withstand all stress and strain.

The "Dart" is easily and quickly connected whether pipes are in or out of alignment.



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DART UNION CO., LTD.

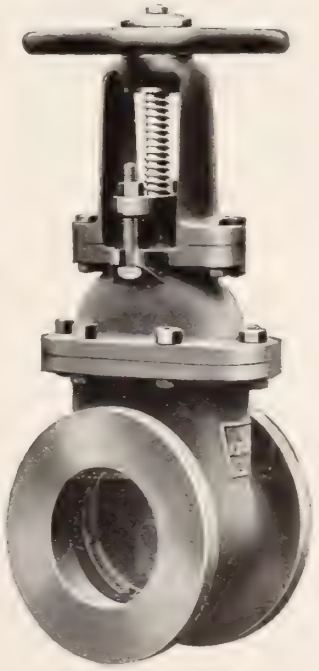
TORONTO

Sold by all Jobbers

There Are Lots of Gate Valves

advertised and sold, but not all of them possess that neat appearance, combined with strength and stability, which characterizes

KERR IRON BODY GATE VALVES



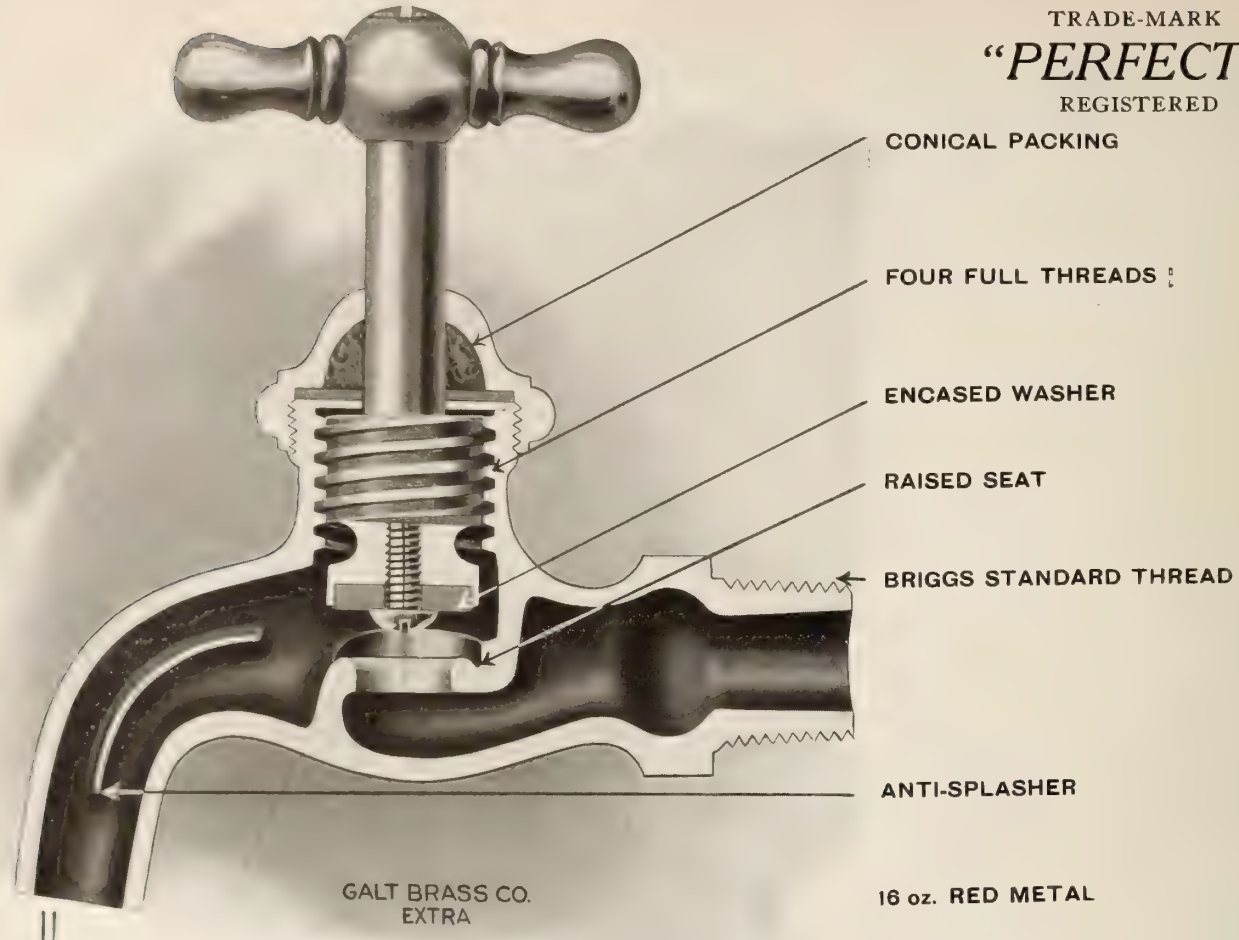
Specify KERR'S (KEYSTONE) Iron Body Gate Valves on your next order, and let us prove what we claim for them.

Our Catalogue No. 5 tells all about them. It is yours for the asking. Write us to-day.

Approved by the Fire Underwriters Association, and Registered by Boiler Inspection Departments of Ontario, Saskatchewan and Alberta.

THE KERR ENGINE COMPANY, LIMITED - Walkerville, Ontario

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol X. Publication Office: TORONTO, MARCH 15, 1916 No. 6

Enameled All-over

VICTOR ONE-PIECE BATH

Enameled Inside

The principle of the Victor Bath is a tub body cast integral with a Base and Wing Plates: the latter in various positions on the Tub Body to make the various Combinations, viz.:

Open Type
Corner Type
Recess Type
End to Wall Type
Back to Wall Type
Also with Extension Rim at End or Back for fittings—thru rim.

PRICES ON REQUEST

The Standard Ideal Company Limited

General Offices and Factories: Port Hope, Canada

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THE LARGEST EXCLUSIVE CAST IRON ENAMELING SANITARY WORKS UNDER THE BRITISH FLAG.

Beaver Brand
Cast Iron Enameled Ware

The pedestal lavatory has come to stay. It is now the most attractive fixture in a bathroom and is reasonable in price.

Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability

Ask your jobber for BEAVER BRAND CAST IRON ENAMEL WARE and build up your reputation

EVERY DOLLAR WE OWN STANDS BEHIND THE GOODS WE MAKE

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28 "Service" Branches throughout Canada

Canadian Consolidated Rubber Co., Limited
MONTREAL, P.Q.

IT ALWAYS PAYS TO BUY THE BEST

Just as it pays to plant the best seed, so it always pays to buy the best goods.

Best Quality
Best Construction
Best Workmanship

In our Rubber Goods, it is QUALITY that counts. We stand back of the quality, workmanship and construction of our lines. That protects your interests, and you are sure to be satisfied.

Our line-up is complete, our quality is unexcelled, and our prices are right. Let us show you what we can do.

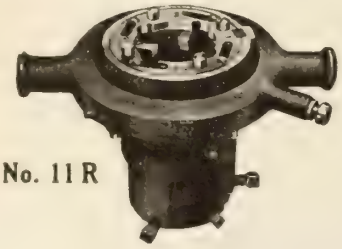
IT IS OUR DESIRE TO SERVE YOU

Canadian Consolidated Rubber Co., Limited
MONTREAL, P.Q.

28 "Service" Branches throughout Canada

"Jardine" and "Toledo" Pipe-Threading Tools

Reduce the labor of pipe threading 50 per cent. and make threads as clean and perfect as if cut on a Lathe with only ONE cut.



No. 11 R

"Jardine" Adjustable Ratchet-Threading Tool

Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely enclosed, excluding chips and dirt.

"Jardine" or "Toledo" dies spare the muscle of the man who does the work, and save money for the man who pays the wages, as they enable one man to do the work of two and cost less for repairs. No cams or jimcracks to wear and get out of order. Cutters that cut, don't squeeze. Set of cutters for each size of pipe. Lead screw ensures perfect pitch and form of threads. Adjustable to all variations of fittings, very durable cutters.

IS NOT A TOOL LIKE THIS WORTH YOUR CLOSEST INVESTIGATION?

We'll be pleased to put you in touch with users and send catalog. Write!

All threads finished at one cut. One man does the work of two.

MADE IN CANADA

A. B. JARDINE & CO.

HESPELER, ONT.

Sole makers of "Jardine" Pipe-Threading Tools
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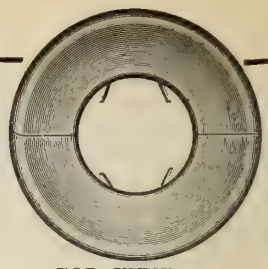
OPEN VIEW NO. 10-A.

The CEILING PLATE that's better



TOP VIEW NO. 10-A.

THE NO. 10—A NARROW FLANGE PLATE IS A STEEL HINGED PLATE. FLANGES ¾" WIDE. HIGHLY FINISHED. ESPECIALLY DESIGNED FOR TWIN CONNECTION "NARROW."

Gem No. 4.

The split ceiling plate is coming more and more into use than ever and ALWAYS GIVES A NICE FINISH, because it can be attached to mains and risers at the very last, and is not exposed during completion of a building on the floors.

High quality at the right price.

Gem No. 4 Automatic Air Valve

Made from the best brass obtainable. Pressed shell and pressed brass base which eliminate danger from blowholes, which is a fault with cast bases.

Write for catalog showing our complete line of specialties.

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Guaranteed Five Years.

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FLANGED FITTINGS and SCREWED FITTINGS

We manufacture and carry in stock a complete line of flanged and screwed steam fittings.

WARDEN KING LIMITED, MONTREAL

Branch: 200 Adelaide St. West, TORONTO **City Sales Office: 151 Craig Street West, MONTREAL**

TRADE JENKINS MARK

TRADE JENKINS MARK

Jenkins Bros.' Pump Valves Stop Pump Losses

The efficiency of a pump is measured largely by the efficiency of its valves in the fluid end.
It is therefore very obvious that care should be exercised in the selection of the *right* pump valves, no matter what pump you buy.

When you buy a new pump, any manufacturer will gladly equip with Jenkins Bros.' Pump Valves, if you will *specify Jenkins Bros.'*

Or if your pumps, now in use, need new valves—valves that are right—valves that stay tight—valves that stop leaks and losses, *Jenkins Bros.'* is the answer.

Any size—for any pump—for any service—shipped promptly on your order.

Remember, all genuine Jenkins Bros.' Mechanical Rubber Goods are made in our own modern factory, and under our own immediate and careful supervision.
Whether it's a pump value, a valve disc, a gasket, or sheet packing, etc., we know that only the purest Para Rubber and the best ingredients are used—furthermore the quality is backed by the Jenkins Bros.' guarantee. **You know what that is.**

Send for Catalogue No. 8 **JENKINS BROS., Limited** **103 St. Remi St., MONTREAL**

Wolverine Tank Balls

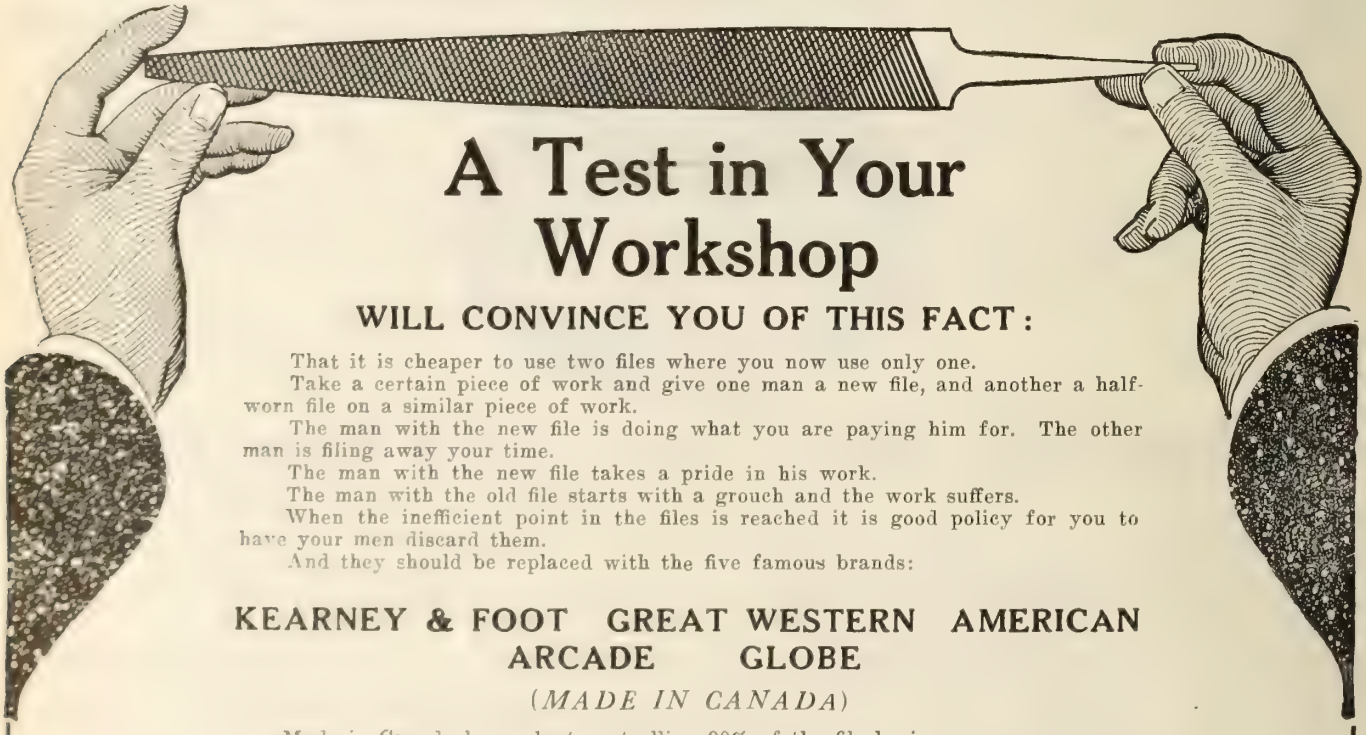
—Guaranteed—

The ball with the reinforced top which makes elongation impossible.

Made of the finest rubber and will outwear three ordinary tank balls.

Our full line of Quality Rubber Goods are at your command, and if you want to give satisfaction all the time, use only Wolverine goods.

Canadian Wolverine Company
Limited
CHATHAM, ONT.



A Test in Your Workshop

WILL CONVINCE YOU OF THIS FACT:

That it is cheaper to use two files where you now use only one.

Take a certain piece of work and give one man a new file, and another a half-worn file on a similar piece of work.

The man with the new file is doing what you are paying him for. The other man is filing away your time.

The man with the new file takes a pride in his work.

The man with the old file starts with a grouch and the work suffers.

When the inefficient point in the files is reached it is good policy for you to have your men discard them.

And they should be replaced with the five famous brands:

KEARNEY & FOOT GREAT WESTERN AMERICAN ARCADE GLOBE

(MADE IN CANADA)

Made in Canada by a plant controlling 90% of the file business.
Backed by 50 years' experience in the making of efficient files.

Send for your FREE Copy of "File Filosophy" NOW.

NICHOLSON FILE COMPANY

PORT HOPE (Dealers Everywhere) ONTARIO

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OSBORNE HOUSE, ISLE OF WIGHT
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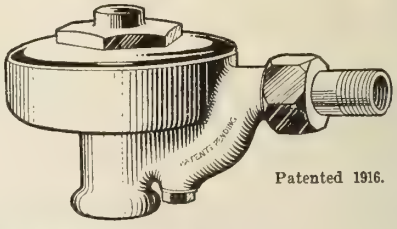

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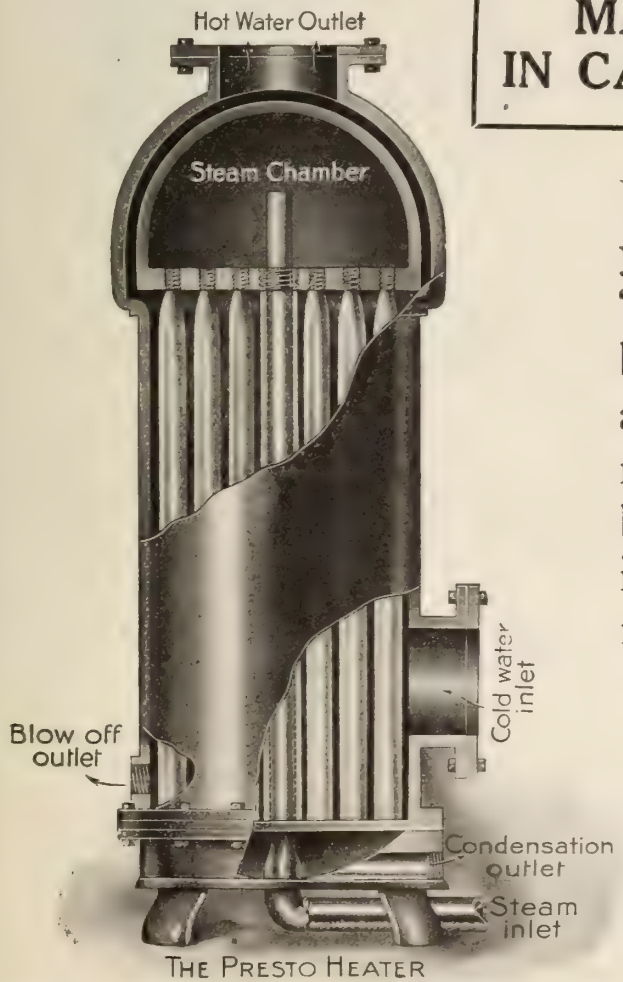

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SANITARY ENGINEER
PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, MARCH 15, 1916 No. 6

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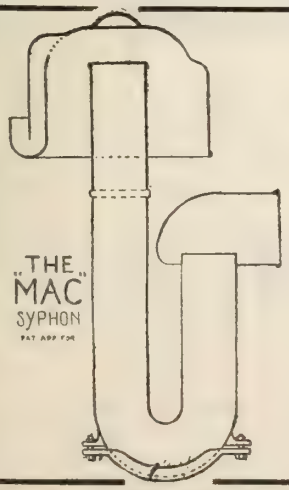

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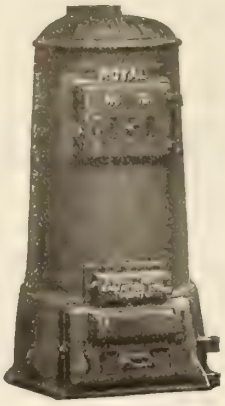

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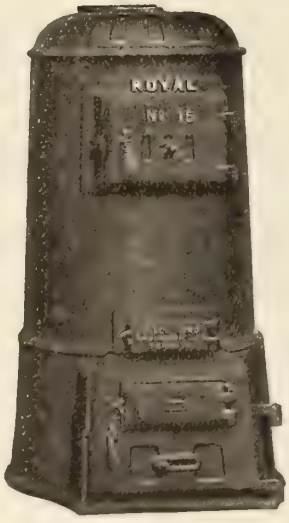

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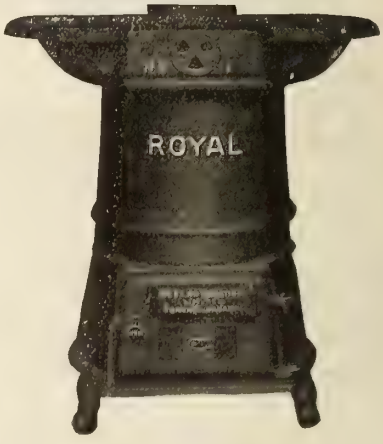

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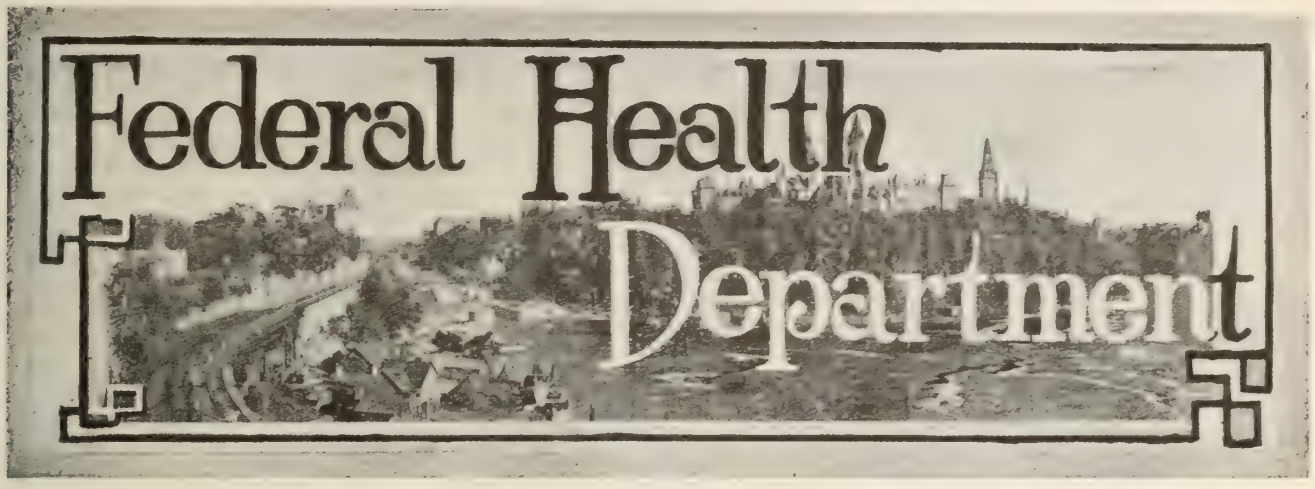
VOL. X. MARCH 15, 1916 No. 6



THE following is reprinted from the House of Commons Debates Ottawa, Feb. 28. It will without doubt prove very interesting to every sanitary engineer throughout the Dominion.

Newspapers throughout the Dominion have commented upon the resolution from almost every point of view. The Sanitary Engineer will publish a series of articles in future issues showing how such a department could be made a great service to the people of Canada.

It might not however be out of place to say that the people of Canada will greatly benefit by the organising of a Federal Department of Health, not a department of medicine.

A properly organized Federal Department of health combining, medical, bacteriological, as well as an engineering department, to govern sanitary heating and ventilation engineering would no doubt prove a boon to the Canadian people.

SUGGESTED DEPARTMENT OF PUBLIC HEALTH

Mr. Michael Steele (South Perth) moved:

That, in the opinion of this House, the organization of the Department of Public Health is desirable in order to conserve in the largest measure possible the physical welfare of the people of this Dominion.

He said: Mr. Speaker, this question has been considered in a more or less causual manner by the different Governments of Canada for the past thirty years. But at no time in the past has the subject been so urgent as it is to-day.

It is amazing at this period of the world's history to read in even a few of our Canadian papers editorials which display a lamentable ignorance of the present day significance of the term, public health. Whenever the subject is referred to, these journals, with gross ignorance of the subject and possibly with some prejudice, interpret it as having reference only to one phase of the medical profession. This view of public health might have been excusable half a century ago, but any person who looks at it in that light to-day merely illustrates the fact, all too apparent, that the subject has not received that intelligent consideration by those assuming to educate our people that its vast importance demands.

At the outset let me say a word to disabuse the minds of a few suspicious and misinformed people and newspapers who are labouring under a misapprehension regarding the object aimed at by this resolution. Permit me to say, it has no reference whatever to the subject of medical education nor to the teachings or beliefs of any school of medicine.

I said that this subject has been discussed in Parliament before, but in view of the great development which Canada will experience in the near future, and, in view of the wonderful advance that has been made in the science of public health, even in the last ten years, no apology is required on my part for its re-introduction at this time. The fact that the Dominion of Canada almost alone among the larger nations of the world has no department of public health, so defined, rests upon the basis upon which the Confederation of Canada was formed as set forth in the British North America Act. In 1867 little thought was given to public health problems, and the British North America Act makes no reference whatever to public health as a function of government. The Act merely states that census and statistics are under the Federal Government, while the management of hospitals, asylums and charities is left under the charge of provincial Government. There has always been some confusion in the minds of our Canadian people regarding the authority of the Federal Government to deal with health matters.

The British North America Act, section 91, declares that the exclusive legislative authority of the Parliament of Canada, extends to all matters coming within the classes of subjects mentions: (1) Census and statistics, and (2) Quarantine and the establishment and maintenance of marine hospitals. Under section 92, enumerating exclusive powers of provincial legislatures, are named among others:

The establishment, maintenance and management of hospitals, asylums and charities and eleemosynary institutions in and for the province, other than marine hospitals.

Practically all health work done in 1867 fell under "Quarantine and Marine Hospitals." Section 91 further states that:

It shall be lawful for the Federal Government of Canada to legislate on all matters not coming within the classes of subjects by this act assigned exclusively to the Legislatures of the Provinces.

This appears with absolute clearness to give power to this Parliament to deal with public health matters, for the only

phases of public health assigned to the provinces by the British North America Act are the establishment, maintenance and management of hospitals, asylums and charities. In so far then as the Federal Government in the interest of the State desires to perform public health work, it has competent power under the constitution to do so.

At the time of Confederation little thought was given to public health problems. No state in the American Union nor any province of Canada had a health department. It is not surprising therefore that a subject of so little interest at that time should receive such scant mention when the powers of the various legislatures were being defined by the Fathers of Confederation. It was not until fifteen years after Confederation, in the year 1882, that the first provincial board of health of Ontario was established, this being the first in Canada. Most of the provinces found it in their own interest to collect vital statistics, as the Federal Government failed to undertake this duty, and this gradually developed into regular departments of health in the various provinces. This fact, however, does not in law relieve the Federal Government of the duty of administering a public health department. As a matter of fact, many health services are to-day conducted by the Federal Government. Let me enumerate some of them:

Under the Inland Revenue Department: the chief analyst deals with composition of foods and drinks.

The Department of Agriculture: (1), the health conditions of construction camps or public works, controlled by Federal Government; (2), public health of Yukon Territory; (3), disease of animals; (4), various lines of work at Experimental Farm relating to plant and animal life; (5), vital statistics.

Department of Interior: (1), inspection of immigrants; (2), town planning and housing; (3), port hospitals; (4), health of Indians.

Department of Militia and Defence: (1), army medical corps and hospital service; (2), sanitation and food for the army.

Department of Public Works: Sanitary inspection of public buildings.

Department of Marine and Fisheries: (1), studies of fish; (2), examination of pilots; (3), hospital care of sailors; (4), sanitation of ships; (5), health of sailors; (6), food for the navy.

Post Office Department: (1), sanitation of post offices; (2) infectious diseases as transmitted through mails.

Department of Finance; Infections diseases through handling money.

Department of Justice: (1), sanitation of prisons; (2), diseases of criminals.

These are sufficient to show the various lines of work now being done and the various directions in which expert scientific research will be required in the near future. When, therefore, it is contended that the Federal Government has no power under the British North America Act, we can reply that the Government has for years been taking control of much health work, and when it is asserted that public health is not the duty of the Federal Government under the British North America Act, it can with equal force and logic be insisted that public health is not a function laid upon the provinces since it is nowhere referred to in the Act of Confederation.

The present condition in the administration of health matters in Canada is in itself sufficient to warrant the organization of a special department inasmuch as the distribution of this work among eight or ten departments is not conducive to intelligent nor efficient administration. Let me illustrate this by a reference to the methods of dealing with immigrants. Immigrants are inspected by officers of the Department of the Interior. When placed in quarantine they come under control of officers of the Department of Agriculture; and if necessary that immigrants be sent to a hospital, they come under officers of the Department of Marine and Fisheries. The results of such a system cannot but be lacking in efficiency.

Canada is almost the only country among the larger nations of the world that has no department of public health, defined as such. Every European country, with the exception of two or three of the smaller states, has a public health service. Japan has a most efficient department, and the United States, although for many years content to leave the administration of health matters chiefly to the individual states, have since 1871 gradually been developing a service under the Federal Government. At the close of the Spanish-American war the necessity of an up-to-date service was pressed strongly upon the Federal Government, and in 1902 the Public Health and Marine Hospital service was established and provision made for a hygienic laboratory and an advisory

(Continued on page 30.)

What Is Competition?

Sound Business is Being Wrecked by Competitors Who Have No Regard for the Rights of Others—Quality Will in the End Prevail, and Those Executing High-Grade Work Must Maintain Price.

Monthly letter by the Master Builders of Boston.

On a job of plumbing worth $750, a low bidder was awarded the work at $475. Recently, two years later, alterations were made, and the hot and cold water piping, specified "iron-sized brass" — a good brass pipe — was found to be gilded iron. This meant that the architect was either ignorant, careless, or dishonest.

What is competition?

The above cases, excepting one or two, are typical instances of occurrences which are very common — so common that they would not be worth reciting were our readers only those familiar with building operations. The cases quoted are not garbled or exaggerated, but are normal, and are all actual happenings.

What is competition?

The statement that a careful contractor gets his estimate costs within two per cent. was carefully qualified to apply to well-made plans and specifications, and to an architect with whose methods the bidder is familiar. Architects vary widely in their methods—not affecting the quality of the result—and in their requirements in developing scale drawings from which estimates are usually made. Contractors knowing the architects of Boston (for example) can vary their figures according to the personality or office practice involved. This variation may, on the average, amount to two per cent., and is something for which, of course, a contractor figuring for a strange architect cannot allow.

Beyond the personality of the architect lie the plans and specifications,—varying widely in definiteness and accuracy from a very low limit amounting at times to guesswork upon many points, to a degree of perfection leaving no element indeterminate which affects the

estimate—and this latter accomplishment means some knowledge of how an estimate is made up and of what features affect cost; for no plans and specifications issued for estimating can ordinarily tell everything needful for the execution of the work. Here, again, a contractor's general familiarity with the architect's personality and usual customs are a great help.

What is competition?

The story is told of a contractor in Greece who stood before a statute of a famous oracle, which—following a custom set by Galatea, Hermione, and others—"came off his perch" and walked up to the contractor. "Why this variation from proper statuesque practice?" said the contractor. "Are you not," replied the oracle, "the man considered dishonest until proven honest; the man who has to know what is in an architect's mind when he draws a line; what 'suitable,' 'approved,' 'satisfactory,' and 'practicable' means as he uses them; and how 'reasonable' he is going to be; and do you not have to forecast prices on materials, and particularly on labor with variations beyond your control?" "Certainly," said the contractor; "but that is my job, and I am used to it." "I am something of a prophet myself," said the oracle; "but your job is harder—here, get up on that pedestal, I resign in your favor." "No, thank you," and the contractor walked away; "contractors don't go on that kind of a bust."

The variations in estimates are commonly found, where in an average case the low figure may be twenty per cent. under the high, are not due to a lack of understanding of an architect and his plans and specifications where careful estimators are involved. The worst variations in such cases would probably not exceed six or eight per cent., and this variation would be in either direction. With a poor architect a good contractor would be too high, while with a good architect a poor contractor would be too low. The balance of the too large variation in bids is from other sources, largely the use of subcontractors and the quality of the result. These two points are related, but a good general contractor, doing good work for his own portion, may trade, squeeze, cajole, or drive subbidders down so low that only poor work from them is obtained. Of course in dull times profits will be cut, but in the best of times these are never half so large as the differences between figures. Probably any contractor in Boston would be glad to be assured of 12½ per cent. gross or 7½ per cent. net, and would gladly take all the work he could get at those figures.

The element of error in estimating, due to carelessness or other mistakes not arising from inability, is of course a recurring one; but among careful men this is far less frequent than is commonly supposed. Error due to bad judgment or downright incompetency in estimating always plays a part, and in an award based upon price alone such an estimate is obviously dangerous. The use of a bond to secure an owner puts a certain burden of investigating the contractor upon the bonding company. It has no particular result otherwise—contractors can get bonds

An estimate far below a group of figures, a frequent happening, can only mean one of three things:

1. An error on the part of a man doing good work—and who will do the job properly and suffer by his error

2. An honest price from an honest man who gives the best value of which he is capable, but whose work is low in quality.

3. A cut-throat price from a cheap man who will save or skimp where he can, trust more or less to luck to come out square, and who cares little for results if he can "get by."

The two latter are the usual low bidders, and the last is the man more commonly found surprising every one by his low figures until finally he is pushed to the wall and another of the same kind takes his place.

What is competition?

An architect who, through carelessness or ignorance, allows work to be done in any respect differently, except as to quality which he cannot much control, from what is planned and specified, helps the low bidders and hurts the others—for the others may have figured to do work right, while the low man may "have to have" modifications made for him.

What is competition?

Here have been cited some of the things which make modern competition in the building business usually a farce. Here are laid down things architects are telling their clients — nothing herein stated is contrary to the general experience of architects and contractors.

What is competition?

The architect, the doctor, the lawyer, any professional man,—and the tailor, the dressmaker, the milliner,—what do all of these know of competition? The first lot have no price competition, but success depends on opportunity and capability. The last lot, if they have any ability, quickly get out of the class where prices are compared. Why is all this? Why do not architects compete in prices charged? Because a large group of them—including most of the leading men—have agreed not to. Why did they agree not to? Because—but probably our readers are beyond the Rollo class—and won't need the Jonas and Rollo method carried further in this direction.

The Century Directory defines the word "Competition" as follows: "The act of seeking or endeavoring to gain what another is endeavoring to gain at the same time." This definition in itself seems sufficiently clear to be easily comprehended by all of us. But what has become the meaning of the word as applied to the building business; what is it as we really understand it?"

To such extremes has the meaning of the word been distorted as to almost blot out its primary definition. Competition in feats of prowess or skill or art always has and always will mean only strength, agility, perfection, excellence, and quality. Why should it not mean the same when applied to work?

Unfortunately, we have grown to associate this word with one consideration only,—that of price; and the word today often means the endeavoring to gain what another wants by the exercise of cupidity, without regard to perfection, excellence, or quality. Such competition is unfair and is based on the policy of "each one for himself and the devil take the hindmost." "Those conducting their business along these lines show an utter disregard for the rights of others. Competition in the form of mere price comparison is the most degrading form of competition to those who indulge in it." As has been said recently: "The only phase of competition which can benefit humanity is quality competition, and that is the exact antithesis of price competition. The two cannot ride in the same boat. When price competition begins, quality competition ceases." We all know that to be a fact. Why should it not be adopted as the fundamental principle of the building business?

Where did the practice of awarding the contract to the lowest bidder begin? What excuse has such a practice for existing? It is impossible to secure the best or even good work by such a method.

Why should not the Master Builders' Association take the initiative in an attempt to correct this method? Why should it not lead in an earnest endeavor to persuade architects and owners to abandon this practice and adopt a new one? Suppose, as another suggestion, they were to award the contract to the "average" bidder; would not this retain all the essentials of competitive bidding, eliminate all temptation on the part of the bidders to "skin the job," and secure for the owners better results in accordance with the true intent and meaning of the plans and specifications?

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 24.

However reliable filters as described in the previous article may be when properly managed, there is no doubt that greater reliance can be placed on boiling the water. Bacteria may from various causes pass or grow through a filter but there are no disease bacteria that can withstand boiling for any length of time. It is stated that typhoid and cholera bacteria die in five minutes or less. Five minutes brisk boiling should therefore be ordinarily sufficient and is a simple precaution every householder can take when the water supply

Fig. 56.—Gas-operated Forbes Water Sterilizer.

is suspected. To make the water palatable it should be subsequently cooled and aerated. Of the sterilizers adapted for household use mention can be made of the Forbes Patent Water Sterilizer which is described in Modern Methods of Water Purification by Don and Chisholm as follows:

"This apparatus has been adopted in the United States army, where several thousand are in daily use. A feature of the patent is that the water is just brought to the point of ebullition and then immediately cooled, so that it issues from the sterilizer at a temperature not many degrees above that at which it entered. Within the body of the apparatus the raw water is made to ascend in a number of parallel columns. These parallel conduits are confined by thin metallic walls, and between them descends the warm water that has left the boiler. A ready interchange of heat takes place, so that the raw water arrives at the boiler quite hot, while the sterilized water has parted with much of its heat by the time that it has sunk to the bottom, where it finds an outlet.

The raw water as it rises in temperature tends to lose aeration, but owing to the construction of the sterilizer the oxygen and carbonic acid expelled by the heating are carried along in the stream, and are reabsorbed as the temperature falls. For this reason the water which flows from the outlet is found to be so well aerated that it has none of the flatness and insipidity of water which has been boiled in an open vessel. That a satisfactory aeration remains has been proved by experiments carried out by the military authorities in the United States.

The arrangement in parallel columns of incoming and outgoing streams has the double advantage of economizing heat and of cooling the effluent. The sterilizer will work continuously for years, and cleaning is not required. Muddy water should be subjected to rough filteration before being introduced."

The price of the gas-operated sterilizer shown in Fig. 56 is listed at $55.00 f.o.b. Toronto. According to the advertising literature the capacity is two wine gallons per hour and each gallon sterilized requires one cubic foot of city or acetylene gas. The electric model requires 113 watts per gallon. A natural stone pressure filter is supplied to attach to kitchen faucet or pipe so that the raw water can be filtered before being sterilized.

Fig. 57 shows a larger apparatus for use in factories, schools, etc. It can be operated economically by exhause steam from a boiler or by gas or electricity.

Purification of Water by the Use of Chemicals

The ideal chemical for the purpose of purifying or sterilizing water is one that:

(1) is cheap.
(2) has only to be added in small quantities to produce sterilization.
(3) leaves no harmful residue.
(4) causes no objectionable taste or smell.

For many years efforts have been made to find such a chemical. Recently calcium hypochlorite has been used with marked success. As it is not only widely used for water purification in many towns and cities but can also be applied in the household, a few notes and observations may be interesting.

Calcium hypochlorite is known variously as hypochlorite of lime, chloride

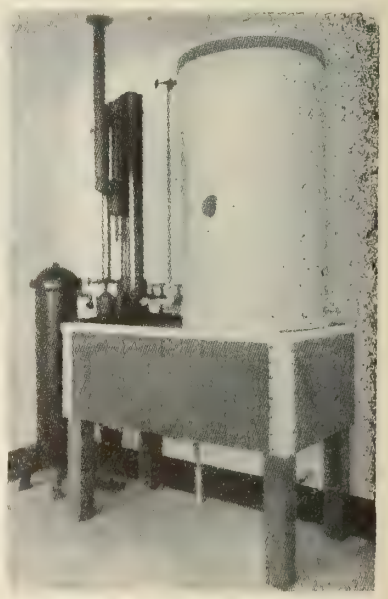


Fig. 57—Forbes Sterilizing Plant for Factories and large Buildings.

of lime and is also frequently referred to as bleaching powder. It is sometimes alluded to as "hypo". Water that has been treated with this chemical is referred to as being chlorinated, sometimes as "doped". Its chemical composition is represented by the formula, $CaOCl_2$, which indicates that it is a compound of Calcium, Oxygen and Chlorine. When the hypochlorite is added to the water to be treated hypochlorous acid is formed. New hypo-

ordinary commercial hypochloride conpoisonous acid but a powerful oxidizing agent. When it comes in contact with organic matter in the water it is decomposed and the oxygen set free kills the bacteria, deodorizes and oxidizes the organic matter present. Although it is the oxygen that does the work of sterilization, the strength of the bleaching powder is referred to in terms of "available chlorine". The ordinary comercial hypochloride contains by weight only about one-third of available chlorine.

The amount of available chlorine necessary to kill the objectionable bacteria varies from about 0.2 to 1.5 parts per million, depending on the character of the water to be treated. One part per million of available chlorine is equal to 10 pounds per million Imperial gallons. This requires about 30 pounds of commercial hypochlorite which consists of chlorine gas in combination with slaked lime, the chlorine being prepared by the electrolysis of common salt and costs about 1½ cents per pound. Evidently a very inexpensive operation, when we consider that in our cities the per capita consumption of water for all purposes varies from 100 or less to 200 gallons per day.

It has been found that color and turbidity in the water cause more "hypo" to be used. Another point noted is that the higher the temperature of the water the more quickly will the sterilization occur.

The object in sterilization of water is to add enough chemical to destroy the bacteria but to have no "free chlorine" left in the water when it reaches the consumer. In the case of public supplies the time between adding the hypochlorite and before reaching the first tap is generally given as at least one-half hour.

There are many complaints made about "doped" water but they are not as a rule well founded. Experiments have been made which seem to conclusively prove that seeds, plants and flowers are not in the least adversely affected by a solution of hypochlorite of lime containing even as high as 100 parts per million of available chlorine (the greatest amount ordinarily used is only 1.5 parts per million).

All animals will drink chlorinated water if too much chemical has not been used. If much more of the chemical is added than is needed to oxidize the bacteria and other organic matter present, animals will not drink, probably due to their acute sense of smell. No ill effects were noted with fish in an aquarium when doped water was used. It has been claimed that fish eggs will not hatch as well if free chlorine is present but otherwise chlorinated water does not appear to affect them.

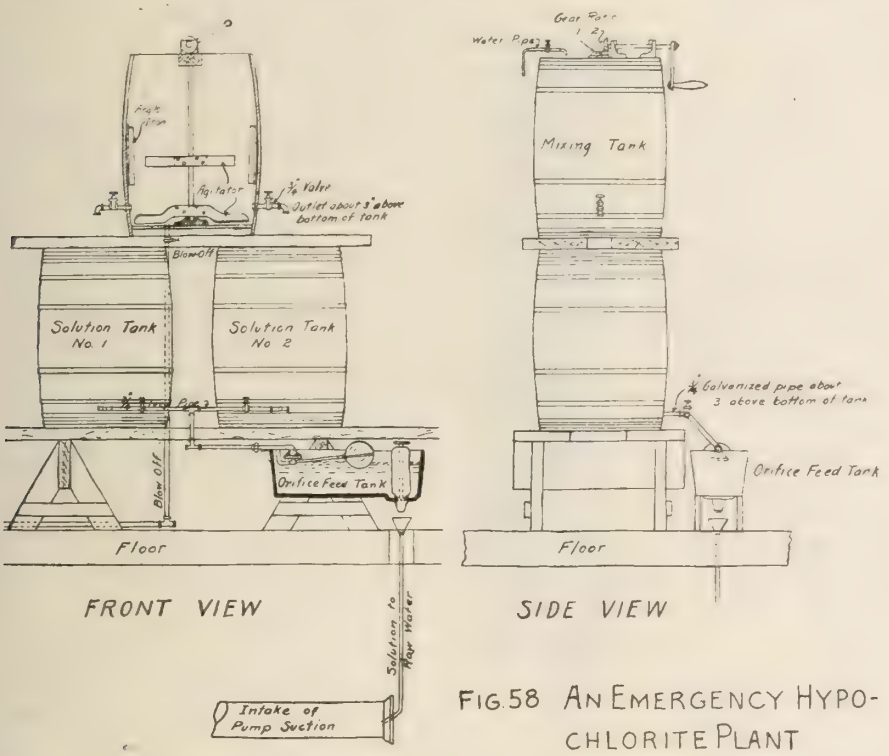


FIG. 58 AN EMERGENCY HYPOCHLORITE PLANT

Much is heard of objectionable smells and tastes and the statements that chlorinated water is injurious to the skin for washing or if taken internally. Such statements and such objections might be regarded in the light of the following incident that came under the writer's notice. In a Western town it had been decided to chlorinate the water supply, the chlorination to commence on a Monday morning. On Monday complaints began to come in about the taste, smell and appearance of the water under the new conditions. For some unexpected delay the chlorinating plant did not as a matter of fact operate until Tuesday. This shows what imagination founded on prejudice will do.

However carefully a water is treated with bleaching powder there may frequently when heated be noted a peculiar odor due to chlorine compounds. This is certainly an objection but it surely cannot outweigh the advantages of a sterile water which can be obtained by careful sterilization.

A recent canvas of the different cities and towns in Canada and the United States showed a wide use of the hypochlorite treatment. In one instance 1.5 parts per million of available chlorine was reported as giving no objectionable taste or odor. In many instances 1 part per million gave no trouble and on the average there was no objection to 0.5 parts per million of available chlorine.

When the writer was in the City of Washinton a few years ago he was informed by one of the chemists at the filtration plant that after the water came from the sand filters there was still present about seven bacteria per cubic centimeter but the people of Washington refused to have the water chlorinated. What objections might be taken to "doped" water was surely nothing compared to the possibility of one of those seven being a typhoid bacterium.

A chlorinating plant generally consists of a small mixing tank for preparing the strong solution, two dilution and storage tanks (for alternate use) and an orifice feed tank for applying the solution at a uniform rate. If the tanks are to be permanent, wooden tanks are not satisfactory and they should be constructed of concrete lined with asphaltum to withstand the action of the strong solution of bleaching powder. The essential features of any plant are however the same as those shown in Fig. 58. This is an emergency hypochlorite plant adopted by a number of boards of health in the United States. It is portable and can be quickly sent to, and set up in any town where the public water supply is suspected. In a bulletin issued by the State Board of Health of New Hampshire the plant is described as follows:

> This outfit,—the cost of which, inclusive of a porcelain-lined feed tank with hard rubber float valve and orifice, is about $60,—consists of three hard wood barrels of about 50 gallons capacity, serving respectively for mixing and storage together with the feed regulating device. The mixing barrel is provided with stirrers operated by a hand crank and gears. The inside of these barrels as well as all metal work are protected from corrosion by two coats of asphalt paint. The pip-

ing is of brass, which resists corrosion better than galvanized iron. The [illegible] are formed with tees rather than with ells, in order to facilitate cleaning out.

Bleaching powder has quite a corrosive action upon both iron and soft wood. Cement should always be adopted for permanent construction although oak and cypress will last for some time. The most resistant common metals are bronze and brass. Hard rubber is unattacked.

To operate, the amount of bleaching powder required for a half day or day's run is placed in the mixing barrel, water added to about half full, and the mixer operated for several minutes. If desired, water may be then added until the barrel is nearly full, the stirring continued, and the contents allowed to settle until perfectly clear before drawing off into one of the storage barrels. In order to ensure continuity of operation, the other barrel is filled in the same way and kept in reserve.

If desired the water in the household can be chlorinated as explained in "A Simple Method of Water Purification", a circular issued by the Ontario Board of Health:

A level teaspoon of chloride of lime should be rubbed into a teacup of water. This solution should be diluted with three cupfuls of water, and a teaspoonful of the whole quantity should be added to each two gallon pail of drinking water. This will give 0.4 or 0.5 parts of free chlorine to a million parts of water and will in ten minutes destroy all typhoid and colon bacilli or other dysentry-producing organisms in the water. Moreover, however, all traces of the chlorine will rapidly disappear.

This method of purification has been tested with Toronto Bay water, inoculated with millions of bacteria. Every germ has been destroyed and it has been unnecessary to boil the water.

This method should be very valuable for miners, prospectors, campers, and those living in summer resorts where the condition of the waters [illegible] not be above suspicion.

For larger plants "liquid chlorine," which can be had in special iron cylinders, is now sometimes used instead of bleaching powder but the resulting sterilization is accomplished in a similar way. There are also other methods for the purification of water supplies, such as sand filters, mechanical filters, and the use of ozone, but [illegible] are generally for larger plants they will not be discussed here.

At the yearly military camp at Niagara-on-the-Lake, the water used is taken from the Niagara river. The [illegible] is [illegible] collection

able amount of bleaching powder was required to be used in an endeavor to sterilize the water. This year a small ultra-violet ray equipment was used with success. It consisted of two mechanical filters and an ultra-violet ray sterilizer, the necessary electric current being generated by a small gasoline engine. The apparatus was capable of sterilizing about 2,000 gallons per hour. Brief mention is made here of this means of water sterilization as there is apparently a future for this method of water purification which may be widely applied.

(Continued in Next Issue.)

New Sanitary and Heating Goods

A NEW RULE WITH A 45 DEGREE SCALE

The Lufkin Rule Co., Windsor, Ontario, are placing on the market a very useful rule. It is of the usual design and is pocket folding, but one side is specially graduated to determine the true length of an offset.

This rule is to be used when working with 45-degree elbows and it absolutely eliminates all figuring and chance for error. It is graduated on one side in standard inches and 8ths, and the other side is marked with what we term a "45-Degree Scale," and has red figures on this side so as to avoid any confusion.

New "Reddy" 45 degrees scale rule for measuring off-sets.

It is used as follows: If you are making a 10-inch offset, in which you are using a "45," you find the 10-inch graduation on the standard inch side, turn the rule over, and the graduation directly opposite on the scale side indicates the length of pipe from centre to centre of fittings, necessary for the offset. If the offset is longer than the length of the rule, you simply consider the graduations as feet and fractions, instead of inches and fractions. For example, to make an offset 15 feet, 6 inches, by referring to the scale side, directly opposite 15½ on the standard side, the necessary length of pipe is given, viz.: 21 feet, 11¼ inches. Further particulars may be procured by writing to the named company.

HOT WATER TANK CALCULATOR

In these days when almost every appliance must be regulated and governed by the adoption of scientific principles, it is almost next to impossible to carry in one's mind the information which is necessary to secure maximum efficiency of the various appliances.

Realizing this, the Powers Regulator Co., 159 West Richmond St., Toronto, are distributing a very fine hot water tank calculator. It is made of white celluloid, and by simply turning a centre disc any desired information regarding pipe size, coils and tanks is at once shown.

There are still a limited number for distribution which may be procured by writing to the above address.

STEAM TRAPS

The George W. Cole Co., Toronto, Ont., have issued a new booklet illustrating and describing their line of boiler feed, return feed, lifting and vacuum traps. The illustrations include a diagram of a double trap installation. A table shows fuel losses when using steam pumps instead of return traps while other items include a price list, particulars of the "Cole" oil separator and a list of users of the "Cole" trap. Copies of this booklet may be had on application.

SOME WELL

A certain Illinois city boasted itself because of its artesian well. A colored minister caught the spirit and spoke as follows to his congregation: "Yassa, dis am de fines' artillery well in de worl,. It is fifty thousand feet deep. Dey sent a sample to de State Water Scurvey and it scandalized 40 per cent. hydrophobia."

RAILWAY DON'T MOVE

A party of harmless inmates of an insane asylum, accompanied by a keeper, was taking a walk out for an airing. They met a pedestrian near some railway tracks. Pointing to the tracks the traveller asked one of the lunatics:

"Where does this railway go to?"

The lunatic surveyed him scornfully for a moment and then replied.

"Say governor do think we're crazy? Those tracks don't go anywhere, we keep them in position to run trains on."

OUR SPECIAL SPRING NUMBER

OUR next issue, that of April 1st, will take the form of our first special spring number and we can assure our readers that no pains will be spared to make it the best number yet offered to them.

The editorial staff are at present engaged in securing material for a number of live articles dealing with various phases of the sanitary engineer's business and which will be of the greatest interest to all members of the craft.

Service, or rather the rendering of efficient service is coming to be regarded nowadays as the surest road to success. The one who can render the greatest amount of service, be it the individual, the firm, or the newspaper, is the one that will win out in the end and it is with this fact firmly fixed in mind that SANITARY ENGINEER is endeavoring to follow closely the lines it has marked out for itself in the past.

The present moment is not inopportune to take a backward glance at the past history of SANITARY ENGINEER.

As most of our readers are aware, for a period of some twenty years the interests of the craft were exposed and cared for by our allied contemporary, HARDWARE AND METAL. This was previous to the publication of a separate paper. But as the business of plumbing and heating increased in importance the MacLean Publishing Co. realized that plumbers and steamfitters could be better served by publishing a paper to their interest.

These views resulted in the birth of "The Plumber and Steamfitter of Canada," and the first issue under this title took form on March 13, 1907.

Springtime is always noted as being "The Time of Awakening" and strange to say the first letter received by the writer asking that he assume the duties of editor, was written on April 1, 1913, about the same time there was considerable talk of changing the name of the paper from "Plumber and Steamfitter" to THE SANITARY ENGINEER, which title was subsequently adopted.

With the April 1 issue, THE SANITARY ENGINEER begins its tenth year. It is in the fight for right, not only in the interest of the trade, but for humanity at large.

THE SANITARY ENGINEER is out to serve. First the craft, who in turn may become more efficient in serving the best interests of humanity.

THE SANITARY ENGINEER realizes its responsibility to the trade and is always on the lookout for new ideas, new thoughts and new methods of installing the various systems of both sanitary and heating engineering. It desires to serve more and more, not only from a technical standpoint, but from a business and moral standpoint, and with these points in mind, will issue the best paper ever published in the interest of the Canadian craft on April 1, by submitting to the trade its 1916 spring number.

THE SANITARY ENGINEER

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MARCH 15, 1916

OTTAWA'S PROPOSED PLUMBING BY-LAW

ON another page of this issue the proposed plumbing by-law for Ottawa is being commented upon.

In the year 1903, the craft, along with the Board of Health at Ottawa, compiled a by-law governing the construction and inspection of plumbing and local ventilation, and at that period the by-law brought into force was no doubt up-to-date.

To keep it up-to-date the various bodies interested in such constructions had a number of amendments added and obsolete clauses cancelled.

About three years ago, however, there was a general feeling amongst the craft and board of health members that a new plumbing by-law should be compiled.

After two years or more a new by-law was put before the council and finally passed in the early part of the year 1915, and copies were sent out to all those interested in these matters before the mayor added his signature which action would have made the by-law a legal document.

The architects of Ottawa then took exceptions to the by-law as a whole and asked that the mayor refrain from signing it so as to enable the Ottawa architects to report their objections. This letter was sent to the Ottawa civic authorities on June 24, or thereabouts.

From that day to this no word has been received in any shape or form which could be said to point out their objections, notwithstanding the fact that the architects have been asked to report, so as to get the matter setlled.

The architects have taken upon themsedves to make objections and when it comes to actually pointing out their objections they cannot do so.

The fact of the matter is, the architects have no right to raise such objections. It is not within their province to do so. What have they to do with sanitary engineering or plumbing construction? None whatever. There's not one in a thousand that is capable of understanding a plumbing by-law. Then why should they even be allowed to assume the responsibility of objecting to something they as a body know absolutely nothing about?

TORONTO COUNCIL'S DECISION

IN the last issue of THE SANITARY ENGINEER, one of the most important matters taken up was that of the proposal before the Toronto council to place the inspection of plumbing under the jurisdiction of the city architect's department.

There was a feeling amongst the members of the Toronto sanitary engineers that this proposal would, if carried through, create a great deal of trouble for the trade, cause a lot of extra work and unless practical men were retained to do the inspecting, the result would be that the public would not receive the service that is their due, and no saving could be effected.

THE SANITARY ENGINEER took a hand in the question and by co-operating with the craft, was able to show the various members of the council that the step would not be a good one for all concerned.

The proposal was put before the council and we are pleased to be able to give credit when it is due. The council turned the proposal down. Now, in all fairness to the Toronto council, the Toronto sanitary engineers ought to do all in their power to assist this plumbing inspection department to give the best possible service to the citizens of Toronto and to execute their work in such a manner as to cut down cost of maintenance wherever possible, or else to see to it that the maximum of service is rendered to the public for money expended.

This can be done in many ways best known to the trade. It can be done by taking good care that before an inspector is called upon to inspect an installation, that everything is tight and in accordance with the by-law, both in letter and in spirit.

We do not mean by the above statement that such is not done by the majority, but we do know of cases by the score where needless inspections have been called for when these inspections could have been eliminated somewhat.

It would be a difficult task to find a single civic department which can give as valuable a service to the people of Toronto as can the plumbing inspection department. Therefore, let the present council see that the trade appreciate the stand taken in this matter and that their action in keeping the plumbing inspection under the jurisdiction of the Health Department has not been misplaced.

THE UPLIFT MOVEMENT

NEVER in the history of the trade was there such a yearning on the part of the majority of those members carrying on business in the sanitary and heating profession to adopt clean methods in business as there is at the present day. Yet in spite of this tendency there are those who absolutely ignore the rights of other members of the craft and the rights of the people at large.

During the last few weeks the writer has visited upwards of a score of towns, large and small, and in calling on various members, heard their story and discussed the matter from all viewpoints. Only one conclusion can be arrived at, that one should endeavor to do the right thing one's self and apart from all sentiment, should see to it that the other fellow does the same.

Two wrongs never made one right and never will and the person who, in order to procure a contract, will instal lightweight lead bends, inferior quality of goods, terminating the soil pipe into a chimney so as to overcome the cost of a few feet of pipe and a lead roof flange and flashing, is no fit person to engage in the trade. Those sanitary engineers who, know that these tricks are being practised upon an innocent public are just as much to blame as those doing such work.

It is all very well to feel that one does not care to charge a fellow craftsman with such practices; but right is right, and to prevent having thieves in our community one must make it difficult for another to steal. The sooner the craft take this matter up in a stern manner and see to it that all such schemes as aforementioned are stopped, just so soon will the public begin to respect the craft as a whole.

IT IS a very old, but none the less a very wise saying that "no business is greater than the man who runs it." This may be amplified to say that no business is greater than the corporation that runs it; and the corporation is no bigger than the board of directors, or the president, or the manager who runs the Board of Directors.

SPECIFICATIONS

IF there is one thing which causes trouble for the sanitary and heating engineers more than another, it is the wording of specifications drawn up by impractical men, such as architects.

We herewith reprint as an instance of this one set of specifications which accompanied a set of plans for a residence recently built:

PLUMBING SPECIFICATIONS

Soil Pipe—Provide and run 4" med. soil pipe from point just outside, continuing straight up through roof, leaving necessary connection for bath, basin, closet and sink.

Bath—Provide and fit up 1—5' enamel bath, with 3" R.R., combination taps, ⅜ nickel-plated supplies, overflow and waste, and connect same with cold and hot water.

Basin—Provide and fit up 1—19 x 24 enamel basin with 4" apron, index taps, ⅜ nickel-plated supplies, 1—¼ Femco trap, and connect same with cold and hot water.

Closet—Provide and fit up 1—Low-down closet of an approved make, with post-hinge seat and connect with cold water.

Sink—Provide and fit up 1—18 x 30 roll-rim sink, with lever-handle, quick-opening taps, 1—½ Wolverine trap, and connect same with cold and hot water.

Boiler—Provide and fit up 1—30-gal. boiler in basement and connect to furnace.

These specifications were drawn up by an architect who pretended to know all the necessary requirements which should be embodied in plumbing specifications. It can easily be seen that any number of tenders, all for various sums could be furnished and none of them would possibly be fair to the owner. In this particular case a number of tenders were submitted varying widely. If, however, a set of specifications were properly drawn up, it is improbable that there would be very much difference between them.

Another clause in almost all plumbing specifications drawn up by architects reads something like this:

> "In case of there being any errors or omissions in the above specifications, the successful contractor shall assume all responsibility for said omissions, and shall furnish all labor and material required to be embodied in the complete installation. He shall also be held responsible for the proper working of such installation when completed."

Seldom, if ever, do specifications leave an architect's office without some such condition which must be accepted. It goes without saying that a set of specifications drawn up by any such persons admits their own inability to specify properly what is really required.

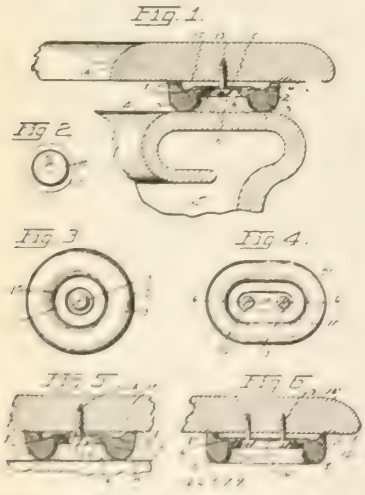
New Canadian Patents

No. 164,579

The B. O. T. Manufacturing Company Limited, Toronto, Ontario, Canada, assignee of Tilghman J. Florey, Washington, New Jersey. U.S.A., 31st August 1915; 6 years. Filed 15th May, 1915. Receipt No. 251,796.

Claim.—1. The combination with a closet bowl having a rim adapted to support a seat, and a seat overlying the said rim, of a buffer secured to the bottom side of the seat and engaging the said rim, said buffer comprising an elastic ring having a rounding rib bearing directly upon the said rim, and having a flange surrounding the opening in the ring, a support for said ring having a circular portion filling the said opening and having a trough-like margin engaging the said flange and the screw piercing said support and screwed into the seat for holding said ring in place.

2. The combination with a closet bowl having a rim adapted to support a seat, and a seat overlying the said rim, of a bumper carried by the under side of said seat and engaging the rim of the bowl, said bumper comprising an elastic rubber part having a depending annular rib bearing directly upon said rim and a flange surrounding the opening in said part, a support for said part having a portion filling the said opening and having an annular margin engaging said



164,579. Pneumatic Buffer for Closet Seats.

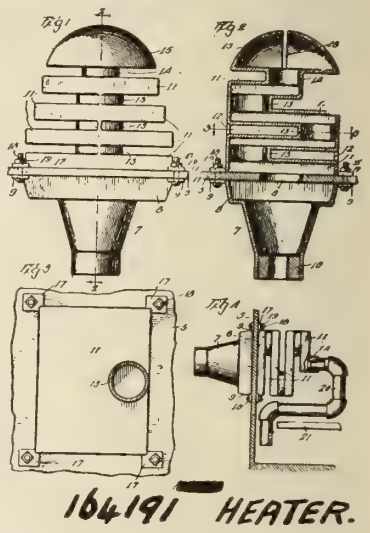
[illegible] and a fastening device for securing said part to the said seat.

3. The combination with a closet bowl having a rim adapted to support a seat, and a seat [illegible] above said rim, of a buffer interposed between said seat and said rim, said buffer comprising an elastic rubber body having a depending annular rib which engages the rim of the bowl, and having an upwardly projecting annular bearing surface engaging the bottom side of the seat, said buffer having a flange surrounding the central opening in the body, a washer filling the opening in said body and having a trough-like portion to receive said flange for supporting the body, and a screw piercing said washer and screwed into the seat for adjustably holding the body in place.

4. A pneumatic bumper for closet seats, comprising an elastic rubber body having an opening in its center, said body having an annular upturned portion for engaging the bottom side of a closet seat, and having depending annular rib adapted to contact with the rim of a closet bowl, the central portion of said body surrounding the opening consisting of a flange which is normally spaced from the bottom of the seat and also from the top surface of the rim for providing oppositely facing cavities in which air is entrapped for producing pneumatic cushions, and fastening means comprising a plate disposed in the opening of the body and a screw which pierces said plate and is screwed into the seat for holding the bumper yieldingly in place.

5. The combination with a water closet bowl having a rim adapted to support a seat, and a seat suitably hinged for overlying said rim, of a buffer interposed between said seat and said rim, said buffer comprising an elastic body having a rib adapted to contact with the rim, and having an annular bearing surface adapted to engage the under side of the seat, said rib and said bearing surface arranged adjacent the periphery of the body and surrounding an annular flange which skirts the open center of the body, a supporting disc disposed in the central opening of the body having a trough-like margin to receive said flange, and a screw piercing the center of said disc and screwed into the seat for yieldingly securing said body to the seat.

6. A pneumatic bumper for closet seats, comprising an elastic part, having a continuous depending rib adapted to contact with the surface of the rim of a closet bowl, and having an upwardly projecting continuous bearing surface adapted to engage the under side of a closet seat, said rib and said bearing surface surrounding a clear opening in said part, a supporting plate filling the opening in said part, said plate disposed in a plane substantially midway between the extreme top and bottom surfaces of said part for providing a fastening device piercing said plate and secured to



the set for holding the bumper in place.

7. The combination with the rim of a closet bowl, and a seat hinged for movement toward and away from said rim, of a buffer interposed between the seat and said rim, said buffer comprising an elastic body having an annular bumping rib adapted to engage the top surface of the rim, and having an annular bearing surface adapted to engage the under side of the seat, a flange surrounding an opening in said body, said flange disposed in a plane substantially midway between the top of said bearing surface and the bottom of said rib for providing upper and lower cavities in which the air is entrapped for absorbing the shocks and jars due to the falling of the seat upon the rim, a supporting member closing the opening in said body and having an annular portion engaging the said flange, and fastening means for securing said body to the seat.

No. 164,191

The Crown Fuel Saver Company, assignee of Nelson J. Russell, both of Chicago, Illinois, U.S.A., 10th August, 1915; 6 years. Filed 31st May, 1915. Receipt No. 252,346.

Claim.—1. In a fuel-saving attachment for furnaces, the combination with a support having an opening therein leading to the combustion chamber of the furnace, of a hollow intake member mounted on the outer surface of said support externally, an inner member consisting of a plurality of spaced apart

casings disposed in vertical planes with each other and having means at its inner portion for the discharge of air therefrom into the furnace, the said inner member being mounted on the said support with its casing adjacent thereto encompassing said opening and providing a chamber around the same, and the casings thereof having alternately, at their opposite outer portions communication with one another.

2. In a fuel-saving attachment for furnaces, the combination with a furnace wall having a doorway, of a hinged door therefor, said door having an opening therein leading to the combustion chamber of the furnace, a hollow intake member mounted on the outer surface of said door and provided with a casing encompassing the opening therein externally, means at the outer end of said member to regulate the admission of air into the same, an inner member consisting of a plurality of successively decreasing spaced apart casings disposed in vertical planes with each other and having means at its inner portion for the discharge of air therefrom into the furnace in a horizontally disposed fan-shape, the said inner member being mounted on the said door with its casing adjacent thereto encompassing the opening within the door, and the casings of said member having alternately at their opposite outer portions communication with one another.

3. In a fuel-saving attachment for furnaces, the combination with a door hinged to the furnace and having an opening therein leading to the combustion chamber of the furnace, of a hollow intake member mounted on the outer surface of said door and provided with a casing encompassing the opening thereof, and an inner member consisting of a plurality of successively decreasing spaced apart casings having means at its inner portion for the discharge of air therefrom into the furnace, the casings thereof having alternately at their opposite outer portions communication with one another, the said inner member being mounted on the said door with its casing adjacent thereto encompassing the opening therein and providing a chamber around said opening, and an expansion chamber, partly spherical in shape and mounted on the inner end of said inner member and communicating therewith through an opening of less area than the other openings leading from one casing to the other, the said expansion chamber having a horizontally disposed slot extended from one side of its vertical wall to the other side thereof, to the end, that the passage of air through said slot will be discharged in a fan-shaped horizontal sheet.

No. 166,720

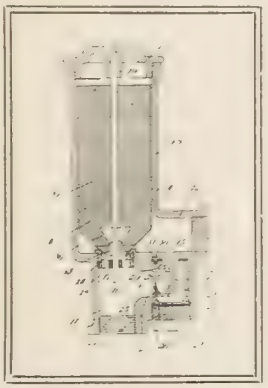
Wilbert Edgar Clark, Toronto, Ontario, Canada, 21st December, 1915; 6 years.

Filed 17th November, 1915. Receipt No. 258,110.

Claim.—I. A temperature booster for a hot water heating system comprising a chamber having two passageways, a weighted valve controlling one passageway, a check valve controlling the other passageway, and means for permitting cleaning of the passageway having the check valve'.

2. A temperature booster for hot water heating systems comprising a chamber having a vertically extending cylindrical portion, a bottom inlet neck and a side outlet neck, and two passageways or ports between the inlet and outlet necks, valve seats on said ports or passageways, a check valve controlling one of said ports or passageways, a weighted valve controlling the other port or passageway.

3. A temperature booster for hot water heating systems comprising a chamber having a vertically extending cylindrical



Clark Hot Water Heating Booster

portion, a bottom inlet neck and a side outlet neck, and two passageways or ports between the inlet and outlet necks, valve seats on said ports or passageways, a check valve controlling one of said ports or passageways, a weighted valve controlling the other port or passageway, a stem for said weighted valve and a removable cover having a guiding socket for said stem.

4. A temperature booster for hot water heating systems comprising a chamber having a vertically extending cylindrical portion, a bottom inlet neck and a side outlet neck, and two passageways or ports between the inlet and outlet necks, valve seats on said ports or passageways, a check valve controlling one of said ports or passageways, a weighted valve controlling the other port or passageway, and a cleanout plug adjacent to the check valve.

5. A temperature booster for hot water heating systems, comprising a chamber having two passageways, a weighted valve controlling one passageway, a valve cage member in the other passageway having a by-pass passage therein, and a check valve controlling said by-pass passageway.

6. A temperature booster for hot water heating systems, comprising a chamber having a main passageway and by-pass passageway, a weighted valve controlling the main passageway, a removable cage member in the by-pass passageway having a passageway therethrough, a removable valve seat in said cage member and a valve thereon.

7. A temperature booster for hot water heating systems, comprising a cylindrical portion having a bottom outlet neck and a side outlet neck, a main passageway or port between the outlet necks and a by-pass passageway or port between said outlet necks, a weighted valve controlling the main passageway or port, a removable cage member mounted in the by-pass passageway or port having a passageway there through, a cup-shaped seat communicating with the bottom of the last-mentioned passageway, a removable plug holding the seat and cage member in position, a valve mounted in the cage member and a removable seat for the valve, substantially as described.

ODD BITS OF NEWS

The imports for consumption into Canada for January of this year were valued at $9,962,556. For the same months last year they were $5,125,009. During January, 1914, they were $7,-029,888.

Exports from Canada were valued at $85,559,782 during January of this year. In January, 1915, the exports were $30,-830,337, and in the same month in 1914, $29,861,359.

Total imports for the twelve months ending January, 1916, were valued at $502,772,844. This is less than we purchased during the twelve months ending January, 1915, when the total was $603,771,358. For the year ending January, 1914, our purchases were valued at $661,272,527.

Exports of Canadian products for the year ending January, 1916, were valued at $836,555,567. For the twelve months ending January, 1915, they were $448,-903,263, and during year ending January, 1914, $481,722,490.

In 1915 Canada's purchases abroad were approximately 23 per cent. less than in 1913, while our sales abroad were 73 per cent. greater last year than in 1913.

Analysis of Canadian Sanitary By-laws

Being a Proposed By-law to Regulate Sanitary Engineering Construction in the City of Ottawa—The Sanitary Engineer Takes Full Responsibility for All or Part of Any Criticism Made on this By-law.

ARTICLE 1.

NO city, town or village can truly lay claim to be fit for human habitation unless there be some kind of sanitary fixtures installed in the buildings occupied either as homes, factories, offices or workshops.

And to ensure that all such fixtures be properly installed, it is necessary that some by-laws shall be in force to govern all such work.

It is also necessary that competent men be appointed to overlook or inspect all installations, if the public are to be safeguarded in every possible way.

It is well known fact that, where there are a large number of plumbers who do no new work but who conduct chiefly repair shops, the sanitary installations in the buildings of that town or city are of a low grade, or are not in the first place properly installed, else the great amount of repair work would not exist.

From the day that plumbing and sanitary fixtures first came into existence the installation, construction and designing of all such constructions or fixtures, has been the exclusive work of the Health Department and the plumbers or sanitary engineers. Such being the case there can be no reason why persons or men at the heads of either the architectural or building departments, or, men who have not devoted years of study to sanitary engineering should be allowed, or even expected to assume the responsibility of such important work.

And when by-laws are being formed there can be no reason why any but practical men, men well versed in all matters which have any direct bearing upon the proper installing, testing and inspection of this kind of work, should be allowed to interfere in such matters in any way.

However, we find that in the case of the City of Ottawa a certain amount of courtesy has, and is being granted to the Ontario Architects, Ottawa branch by the city fathers of Ottawa.

Some time back a considerable amount of time was expended and expense incurred by the officials of the Ottawa Health Department, in co-operation with the Ottawa sanitary engineers, and a by-law was drafted out, which according to the very best present day practice, and past experiences was felt to be all that could be desired.

On June 24 or thereabout J. P. Maclaren on behalf of the Ontario Association of Architects wrote to the city fathers asking them to withhold signing of the proposed by-law on the ground that it would be unfair, and would prove a burden to the public at large. And in spite of the fact that the aforenamed association has repeatedly been asked for a detailed statement of their objections no such statement has up to this date been received.

Now what conclusion is to be drawn from such conduct? Only one, and that is, that while the architects object they cannot find any real reason for objection, because they are not practical sanitary engineers and are not competent to put forth any tangible objections to the proposed by-law.

It is not to be expected that architects could acquire sufficient practical experience to fit them to be judges of such installations as are customarily found at the present day, therefore why try to assume to criticize work of this nature, or even take the responsibility of criticizing the sections of any proposed by-law when such proposed by-law is the work of men with over a quarter of a century's experience?

The Sanitary Engineer purposes to reprint this by-law which since last June has been awaiting the final signature of the Mayor of the city.

By-Law No. —

A By-Law to Regulate Plumbing

Whereas it is necessary in the interest of the public health of the inhabitants of the City to Ottawa to establish regulations according to which plumbing in the buildings in the said city shall be done and constructed, and to determine and define the materials to be used in plumbing work.

Therefore, the Municipal Council of the Corporation of the City of Ottawa by and with the approval of the Provincial Board of Health, enacts as follows:—

Section 1. In this by-law:

(a) "Medical Officer of Health" shall mean the Medical Officer of Health of the said Corporation from time to time appointed pursuant to the provisions of the Public Health Act, and also every person from time to time exercising the rights of or occupying such office.

(b) "Building" shall not include a private stable or a private garage unless the same or some portion thereof is occupied, or is to be occupied, or used for human habitation.

(c) "Owner" shall mean and include the representatives of a deceased owner, the agent of an owner, a lessee, a tenant and an occupant of the building in respect of which or in respect of any portion of which plumbing work is to be done, repaired, replaced or altered.

(d) "Plumbing Work" and "Work" shall mean and include all plumbing work for the doing of which it is provided by this by-law that a permit shall be obtained whether such work is new construction or the repair, alteration or replacement of existing work.

(e) "Permit" shall mean a permit issued by or with the authority of the Medical Officer of Health authorizing the doing of the work specified.

Section 2. Before proceeding with any plumbing work in connection with the ventilation, drainage or waste system of any house or building, the owner thereof shall file a written application for a permit authorizing such work, with the Medical Officer of Health, and such owner shall at the same time file a plan or plans and specifications of the proposed work. Every such plan and specification shall be submitted in duplicate, and if approved of, shall be stamped by the Medical Officer of Health, and one copy thereof shall be returned to the owner and annexed to the permit.

Section 3. No master plumber, plumber or workman shall do any work at or upon any building until he shall have first satisfied himself that the owner thereof has been granted a permit for the doing of the same. The production of a permit with the attached plan and specification stamped "approved" by the Medical Officer of Health shall be sufficient evidence

that the doing of the work has been authorized.

Section 4. A plan of the drainage system, already installed, or proposed to be installed, below the basement or cellar floors of the building in or about which work is to be done shall be submitted for approval and filed with the Medical Officer of Health by every owner making application for a permit.

Section 5. If the Medical Officer of Health finds on examining the plan and specification submitted that the proposed work does not conform with the provisions of this by-law, he shall not issue a permit, and in such case the proposed work shall not be proceeded with. But the Medical Officer of Health may require any plans and specifications of the proposed work submitted to be altered and amended in such manner as to make the same conform with the provisions of this by-law, and upon such alterations and amendments being made may issue a permit authorizing the doing of the work.

Section 6. No alteration or deviation shall be allowed in the excution of work from the plan and specification approved of by the Medical Officer of Health except upon the written application of the owner, to the Medical Officer of Health, and every such application shall be accompanied by a plan and specification shewing the alteration or deviation required, and shall be dealt with as provided by this By-Law.

Section 7. A permit shall be granted or refused without unnecessary delay, and if granted, shall be valid for six months from the date thereof.

Section 8. Every permit shall be hung in a conspicuous place in the building, or in the portion thereof, for which it is issued.

It will be seen that these sections are more or less the usual form of clauses found in all sanitary engineering by-laws. They call for no criticism. We will, therefore pass on to section 9.

Section 9. There may be placed in the main house drain, inside of house wall, a ventilation hand-hole cleaning trap of approved description and make. Between the said trap where used, and the foot of the soil pipe there shall be connected with the main house drain on an inlet pipe four inches in diameter, for the admission of fresh air, to be situated as remote as possible from any opening into the house, and not less than eighteen inches above finished grade, the mouth of which shall be left open, or shall have a cap giving an area of one fourth more than the diameter of the inlet pipe.

It will be seen that the much discussed main house trap is mentioned in this section. Though it does not make the installation of the main house trap compulsory, section 9 permits it, when such traps are installed, however, they must be installed in a proper manner.

It might not be out of order to state that only very few of these traps and fresh air inlets have been installed in Ottawa within the last 10 or 12 years. The Sanitary Engineer would far rather have seen the main house trap abolished except in special cases, and then allowed by permission only of the chief plumbing inspector.

Section 10. Every building shall, except so far as is otherwise expressly provided by this By-Law, have a separate drain from the street sewer connected with such building.

Section 11. A double tenement building in cases where it is connected flush with the line of street, may be connected with one six-inch pipe, or larger street main, with a "Y" junction, placed immediately in front of the front wall thereof, provided an archway is thrown over the same to protect both drains and wall of building.

Section 12. All drains must be properly connected with the private drain and are not to be covered until inspected. In no case shall the drains between the walls of the house and the street line be laid until the private drain from the street line to the public sewer shall first have been laid and connected. Where the tile pipe and the iron pipe are of the same size ,the iron pipe must be connected to the tile drain by a taper pipe.

Section 13. All private drainage trenches from the street line up to the foundation line shall be left open for inspection when the drain is under construction, alteration or repair, and shall not be filled in or closed until the drain has been first examined and approved by the plumbing inspector, provided that if such drain shall have been examined and approved by the City Engineer no further inspection shall be required.

Section 14. Septic tanks or reservoirs of approved design and material may be installed for the temporary drainage of buildings erected upon lots abutting on street where no sewer is available, upon the owner first obtaining a special permit therefor from the Medical Officer of Health, who may impose such requirements in connection therewith as he may consider proper. The issuing of a permit to construct a septic tank or reservoir, shall not authorize the use thereof beyond the date at which a common sewer is first available for draining the building connected therewith, and so soon as a common sewer is constructed with which the drainage system of such building may be connected, the Medical Officer of Health may require the taking up, filling in and disconnecting of such septic tank or reservoir.

No fault can be found with the above sections with one possible exception, and that is with the words "the Medical Officer of Health may require the taking up, filling in and disconnecting of such septic tank or reservoir." It is the candid opinion of The Sanitary Engineer that there should be no "may" about it. All such tanks should be thoroughly cleaned out and left filled in properly, or else taken up.

Continued in next issue.

NEW CANADIAN ATLAS

THE new Atlas of Canada just issued by the Department of the Interior, of which Hon. J. W. Roche is head and W. W. Cory, C.M.G., deputy minister, is one of the most complete compilations of information about the country that could be prepared. The series of maps of the Dominion and provinces are beautiful examples of the cartographers' art. There are maps showing the geological formation, mineral deposits and forest distribution of the whole country. Another series shows the annual rainfall and climatic conditions of various sections at a glance. The canal, telegraph and railway systems are depicted in graphic form in others.

An interesting series of maps shows by colors the origins of the people, while the mixed settlement of the Western provinces is made vivid. Density of population is also shown by colors. The exploration of the country from the earliest discoveries is shown by means of maps also. In addition to the maps there is a very complete series of figures and diagrams illustrating the progress of trade and commerce, agriculture, manufactures, the growth of the Canadian mercantile marine, finance, fisheries and the whole economic activity of the country.

Many figures are given as to population, education, vital statistics and maps of all the cities in Canada are an added useful feature. The whole Atlas is admirably arranged and indexed. It was prepared under the direction of J. E. Chalifour, chief geographer.

Practical Course for Sheet Metal Workers

ARTICLE No. 31 OF SERIES

By CHARLES SEIVERS

IN this article is shown the method of cutting pattern for a mitre in a moulding forming a panel as shown by elevation A-B-C-D. It will be seen there are three different angles shown. At A and B are two right angle or square mitres, at C, an acute angled mitre, and at D an obtuse angled mitre, but while the angles in each of the three cases are different the method of cutting pattern remains the same. At E-F-G is shown a section or profile of moulding to form panel. The first step is to lay out the angles and procure the mitre lines. At A-L.C.M. in Fig. 1. are shown the angles at corresponding letters in elevation and at B-H-D-K at Fig. 2 the angles at corresponding letters at elevation. Having laid out angles place or draw an outline of section in same, as shown, and divide the curved members of the moulding into a number of equal parts. the angle of each straight member forming a division, as showing by 1-2-3 4-5-6, etc., from each of these points draw lines, extending them until they intersect the mitre lines at A-Z and C-M. To lay out patterns draw a line at right angles to C-A. On these lines begining at C and A set off the divisions on section as shown by 1-2-3-4, etc., at Fig.1. Now draw lines joining points 2-2, 3-3, 4-4, etc. At a convenient point on C-A draw a line at right angles to it as 1-12,

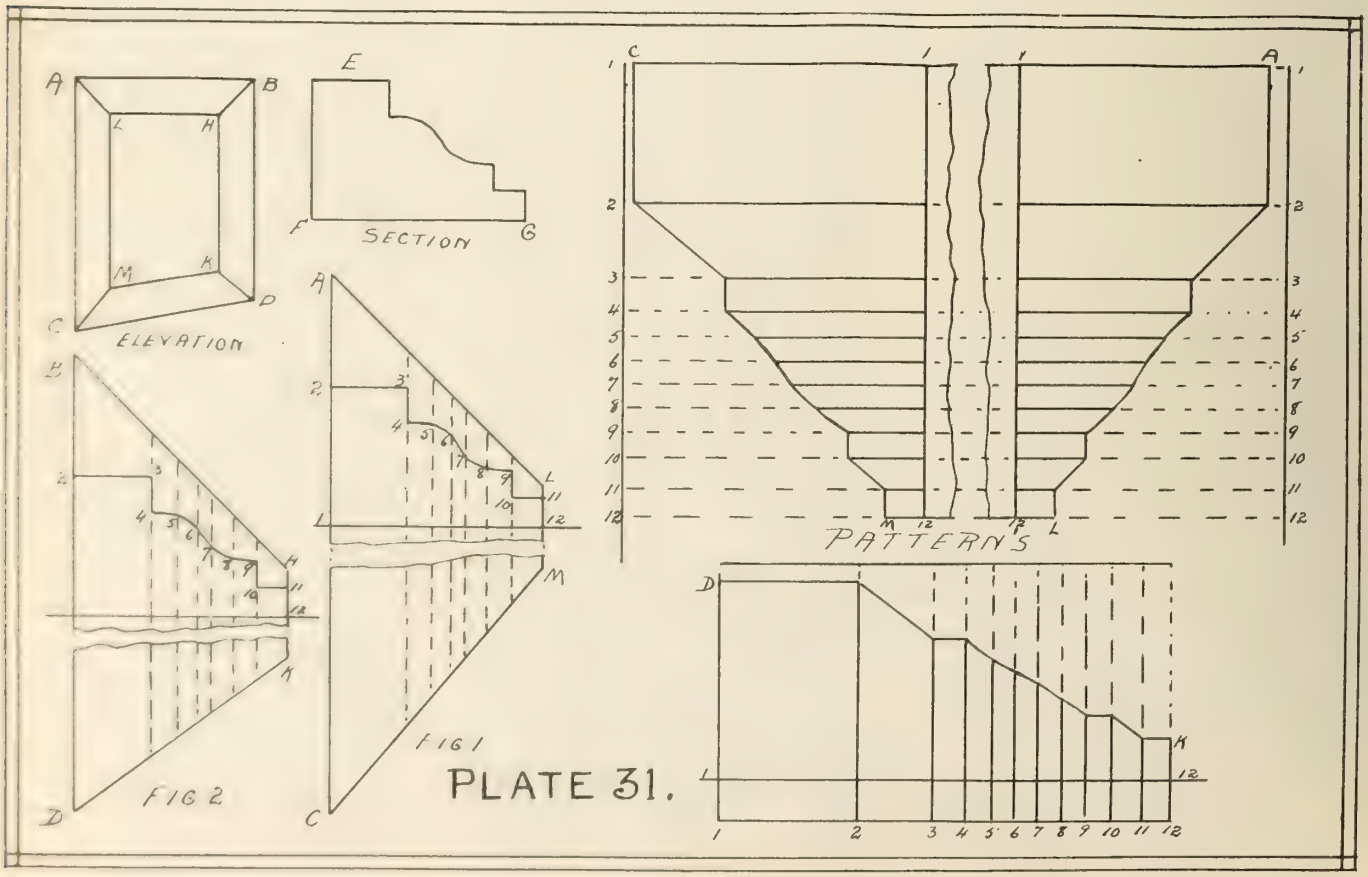
The accompanying article is No. 31 of a course of practical problems for sheet metal workers prepared, especially for the readers of The Sanitary Engineer, by a practical mechanic who is constantly in touch with new problems which are arising in the sheet metal trades. These articles are a regular feature in The Sanitary Engineer, the only paper published in Canada in the interest of sanitary and heating engineering.

using this line from which to set off distance, and obtaining the distances by measuring from line 1-12 at Fig. 1, to the mitre line C-M, then setting off distances obtained on lines numbered the same.

As points 1 and 2, 3 and 4, and 9 and 10, come on same line or in line with each other, the distance from line 1 to 12 to the mitre line is the same for both points. Having set off all the distances from 1 to 12 a line drawn through the points thus obtained will give outline of pattern.

It is even a pretty expensive undertaking to die these days. The Coffin Furniture Manufacturers of Birmingham last month made a further advance of 10 per cent. on all coffin furniture. The war advance now amounts to 60 per cent. One could hardly afford to kick-in at these rates.

Exports from Canadian mines for the month of January of this year were over a million dollars more than the corresponding months last year. The figures are $3,508,769 in January 1915, and $4,654,815 for the first months of this year. For the twelve months ending January 1915, the export of metals was $4,654,815 for the first month of this ending January 1916, $62,960,628.



GOSSIP OF THE TRADE

NEW MONTREAL PUBLIC BATH

ALTHOUGH only a few weeks in existence, the new Montreal public bath is already getting its full share of patronage.

Being built for service more than for architectural beauty is one of its main features which, as time goes on, will be thoroughly appreciated.

No city, however small, can claim to be complete unless a sufficient number of public baths as well as public comfort stations are provided for its citizens, though, of course, public baths are more for older cities where as a rule few natural bathing stations can be provided.

Swimming and bathing has heretofore been looked upon as a summer pastime, but, as the Y.M.C.A. movement has developed, swimming baths have come into greater use.

Very few Y.M.C.A. buildings are built these days which are of any size unless they are equipped with a swimming or plunge bath, thus giving more prominence to all-year-round swimming than was indulged in a few years ago.

Most Modern Bath

Ald. Rubenstein, whose name will be perpetuated by this bath, no doubt feels justly proud at being honored by having this splendid swimming bath named after him. It is without doubt one of the most modern public baths in the Dominion.

It is to be hoped that Montreal will not be satisfied with this, but will build several more, which will no doubt be just as thoroughly appreciated as this one is proving to be.

The tank is 81½ feet long and 35 feet wide.

It is 3 feet 4 inches deep at the shallow end, and does not begin to grow deeper until 25 feet towards the deep end, when it begins to slope to a final depth of 8 feet 6 inches. The tanks holds 18,500 gallons of water and is capable of being filled in one and a half hours. The heating arrangements were prepared under the supervision of Mr. R. Drouin, Superintendent of Municipal Buildings and Public Baths. The water is kept at a uniform temperature of 72 degrees, and cold water can be heated to that temperature in five hours. The room itself is kept at a temperature of 65 degrees.

The place is admirably lighted according to specifications made out by Mr. Arthur Parent, Superintendent of Lighting for the city. Scientific calculations have resulted in a brilliant but carefully diffused light, which is ample, and not too much for the use of a bath. The lighting forms no inconsiderable item in the arrangements. The architect who supervised and planned it throughout was Mr. Alphonse Piche. The land cost $50,000 and the cost of construction of the bath itself was $42,000, a total sum of $92,000.

WINNIPEG NEWS COLUMN

At a meeting of the Winnipeg and district members of the Canadian Institute of Sanitary Engineers on the 11th February, a very interesting discussion took place on the question of grease traps. It was agreed unanimously to recommend that the phrase "and shall have a water cooling jacket" be deleted

Montreal's New Public Swimming Bath

from the by-law, as it was contended that over and above the expense incurred in the installation of the water cooling jacket grease trap it afforded no compensating return by way of preventing the passage of grease to the drain, and especially was this so in large establishments. It was also pointed out that in allowing the installation of these traps, one of the first principles in sanitation, that there should be no direct connection between the water supply and the drainage system, was being violated.

At the meeting on the 25th February, Mr. Jas. Smith gave a very instructive talk on Water Supply and Precautions taken by the military authorities to safeguard the health of the troops in camp and on the march, which was thoroughly enjoyed by those present. This interesting paper appears on other pages of this issue.

TORONTO TECHNICAL SCHOOL NOTES

The evening classes in plumbing and heating are being well attended, and the day classes are now started.

Classes for plumbing and sanitary science will be held every Tuesday afternoon. The heating and ventilating classes are to be held every Thursday afternoon.

Both of the above classes commenced March 7th and 9th respectively.

In this connection it may be mentioned that all boys or apprentices in the employ of members of the Toronto Society of Sanitary and Heating Engineers are given the privilege of attending the technical school upon the above-mentioned days at no expense to those who attend diligently to these classes. It is felt that by paying the wages to all apprentices, the latter will appreciate such a course and the benefits derived will be mutual.

PASSED ON

Moose Jaw loses one of its sanitary and heating engineers in the person of the late Edwin C. Mason, who for many years was actively engaged in this trade.

He had built up a very nice business and leaves a widow and two children, Thelma, aged 8 and Waneda, aged 6, as well as his father, mother, three brothers and three sisters.

NEW BOOKLETS

The Consolidated Engineering Co. are distributing some very useful booklets to the trade describing the Van Auken steam specialties, The Thermograde Modulation system of heating and the Kenealy air conditioning apparatus.

A post card to their offices, Jackson and Canal Streets, Chicago, Ill., will secure any of these booklets.

INTERESTING ESTIMATE BOOK

One of the chief causes for loss in tendering is that fittings of various kinds are omitted. This being the case, the Toronto Society of Domestic, Sanitary and Heating Engineers got out a book; a fascimile of one of the pages is shown herewith. The book consists of 100 pages in duplicate. The sheets are 14 inches wide by 17 inches deep, and are well bound with stiff cardboard binding. It is almost an impossibility to overlook the smallest item, fitting or fixture.

With a view of assisting the trade throughout the Dominion the society are willing to furnish these books to the trade at the exact cost to them. They are not published and sold to make a profit.

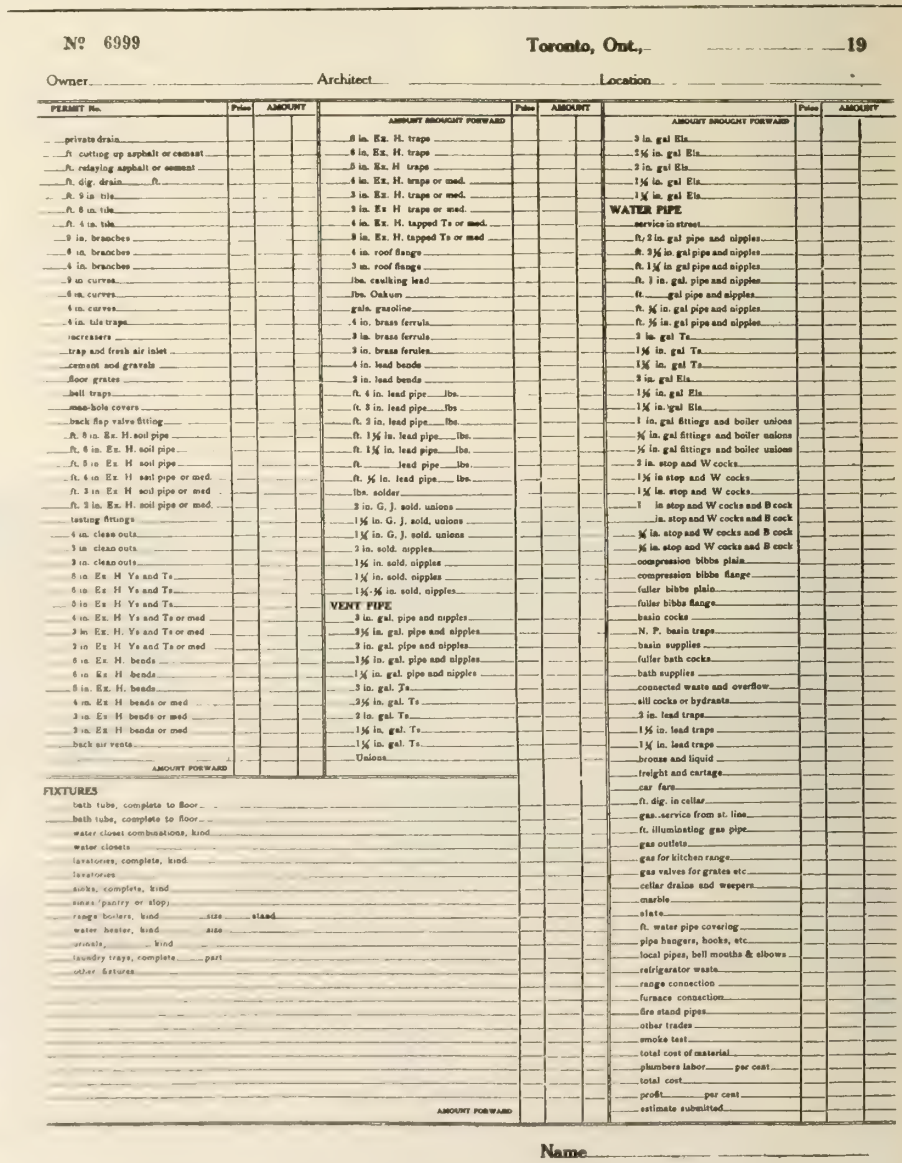
Those desiring to procure one of these books are requested to write to Secretary G. F. Frankland, Ontario Society of Domestic Sanitary and Heating Engineers, 22 College Street, Toronto.

NEW SCHOOL AT BRIGHTON, ONT.

One of the most up-to-date schools in Canada is being erected at Brighton, Ont. It is being equipped with the very latest heating, ventilating and sanitary appliances, including stationary vacuum cleaner and sewage disposal system. The school will be used both as a public and high school.

Brighton is one of the few small towns which can boast of having a number of public-spirited business men among its inhabitants, which accounts for the building of such an up-to-date school, which, when fully completed, will cost approximately $55,000.

It stands on a 12-acre lot, presented to the Board of Education by S. G. M. Nesbitt, Esq., M.P.P. The property is bounded by four roads, and is one of the most desirable locations possible, away from the noise of the railway station and other traffic. A full description of this school will appear in a later issue of The Sanitary Engineer.



Nº 6999 Toronto, Ont., 19

Owner Architect Location

PERMIT No. | Price | AMOUNT

private drain
ft. cutting up asphalt or cement
ft. relaying asphalt or cement
ft. dig. drain ft.
ft. 9 in. tile
ft. 6 in. tile
ft. 4 in. tile
9 in. branches
6 in. branches
4 in. branches
9 in. curves
6 in. curves
4 in. curves
4 in. tile traps
increasers
trap and fresh air inlet
cement and gravels
floor grates
bell traps
rose-hole covers
back flap valve fitting
ft. 8 in. Ex. H. soil pipe
ft. 6 in. Ex. H. soil pipe
ft. 5 in. Ex. H soil pipe
ft. 4 in. Ex. H soil pipe or med.
ft. 3 in. Ex. H soil pipe or med
ft. 2 in. Ex. H. soil pipe or med.
testing fittings
6 in. clean outs
5 in clean outs
3 in. clean outs
8 in. Ex. H Ys and Ts
6 in. Ex. H Ys and Ts
5 in. Ex. H Ys and Ts
6 in. Ex. H. Ys and Ts or med
5 in. Ex. H. Ys and Ts or med
4 in. Ex. H Ys and Ts or med
8 in. Ex. H. bends
6 in. Ex. H bends
5 in. Ex. H. bends
6 in. Ex. H beads or med
5 in. Ex. H beads or med
3 in. Ex. H beads or med
back air vents
AMOUNT FORWARD

FIXTURES
bath tubes, complete to floor
bath tube, complete to floor
water closet combinations, kind
water closets
lavatories, complete, kind
lavatories
sinks, complete, kind
sinks (pantry or slop)
ranges boilers, kind size stand
water heater, kind size
urinals, kind
laundry trays, complete part
other fixtures
AMOUNT FORWARD

AMOUNT BROUGHT FORWARD | Price | AMOUNT

8 in. Ex. H. traps
6 in. Ex. H. traps
5 in. Ex. H traps
4 in. Ex. H. traps or med.
3 in. Ex. H. traps or med.
2 in. Ex H traps or med.
4 in. Ex. H. tapped Ts or med.
3 in. Ex. H. tapped Ts or med
4 in. roof flange
3 in. roof flange
lbs. caulking lead
lbs. Oakum
gals. gasoline
4 in. brass ferrule
3 in. brass ferrule
3 in. brass ferules
4 in. lead bends
3 in. lead bends
ft. 4 in. lead pipe lbs.
ft. 3 in. lead pipe lbs
ft. 2 in. lead pipe lbs.
ft. 1½ in. lead pipe lbs.
ft. 1¼ in. lead pipe lbs.
ft. lead pipe lbs.
ft. ½ in. lead pipe lbs.
lbs. solder
3 in. G. J. sold. unions
1½ in. G. J. sold. unions
1¼ in. G. J. sold. unions
2 in. sold. nipples
1½ in. sold. nipples
1¼ in. sold. nipples
1¼-⅜ in. sold. nipples

VENT PIPE
3 in. gal. pipe and nipples
3½ in. gal. pipe and nipples
3 in. gal. pipe and nipples
1½ in. gal. pipe and nipples
1¼ in. gal. pipe and nipples
3 in. gal. Ts
2½ in. gal. Ts
2 in. gal. Ts
1½ in. gal. Ts
1¼ in. gal. Ts
Unions
AMOUNT FORWARD

AMOUNT BROUGHT FORWARD | Price | AMOUNT

3 in. gal Els.
2½ in. gal Els.
2 in. gal Els.
1½ in. gal Els.
1¼ in. gal Els.

WATER PIPE
service in street
ft. 2 in. gal pipe and nipples
ft. 3½ in. gal pipe and nipples
ft. 1¼ in gal pipe and nipples
ft. 1 in. gal. pipe and nipples
ft. gal pipe and nipples
ft. ¾ in. gal pipe and nipples
ft. ⅜ in. gal pipe and nipples
2 in. gal Ts
1¼ in. gal Ts
1¼ in. gal Ts
2 in. gal Els.
1¼ in. gal Els
1¼ in. gal Els
1 in. gal fittings and boiler unions
¾ in. gal fittings and boiler unions
½ in. gal fittings and boiler unions
2 in. stop and W cocks
1¼ in stop and W cocks
1¼ in. stop and W cocks
1 in stop and W cocks and B cock
in. stop and W cocks and B cock
¾ in. stop and W cocks and B cock
½ in. stop and W cocks and B cock
compression bibbs plain
compression bibbs flange
fuller bibbs plain
fuller bibbs flange
basin cocks
N. P. basin traps
basin supplies
fuller bath cocks
bath supplies
connected waste and overflow
sill cocks or hydrants
3 in. lead traps
1½ in. lead traps
1¼ in. lead traps
bronze and liquid
freight and cartage
car fare
ft. dig. in cellar
gas service from st. line
ft. illuminating gas pipe
gas outlets
gas for kitchen range
gas valves for grates etc
cellar drains and weepers
marble
slate
ft. water pipe covering
pipe hangers, hooks, etc.
local pipes, bell mouths & elbows
refrigerator waste
range connection
furnace connection
fire stand pipes
other trades
smoke test
total cost of material
plumbers labor per cent
total cost
profit per cent
estimate submitted

Name

Fac-simile of book issue and for sale by the Toronto Society of Sanitary Engineers.

COMPENSATION FOR TYPHOID FEVER

An interesting decision has recently been given by the Supreme Court of Wisconsin in regard to the death of an employee caused by typhoid fever, which was contracted by drinking impure water furnished by the employer.

The Court decided that the death was the result of an accident caused by the bad water, and that the employer was liable under the Wisconsin law.

This decision furnishes a precedent on the question whether diseases caused by conditions arising in the course of employment are the result of "accidents" as that term is used in Workmen's Compensation Laws.

TORONTO VISITORS

E .H. Russell, London, the president of the Canadian Society of Domestic Sanitary and Heating Engineers, was a visitor in Toronto on Tuesday, March 7, and along with him came that congenial and ever-smiling member of the craft, John Eggett, of the firm of John Eggett & Co., of the same city.

Both the above gentlemen mentioned that while business in London is not quite up to par, they were getting a fair share of what was going.

Wm. Kerr, chief inspector of sanitary and heating engineering for the Dominion Government, was a visitor to the office of The Sanitary Engineer this week.

SOLD BUSINESS

W. J. Milton, St. Thomas, has disposed of his plumbing business to John McKenzie. Mr. Milton has purchased the general store of E. P. Boughner at Talbotville.

NEW BOOKLET ON GAS MACHINES

A new booklet describing the Tirrill Gas Machine Lighting Co., manufacturers of the famous Tirrill "Equalizing" Gas Machines, is just off the press, FREE to any one, addressing the Company at their New York Office, 103 Park Avenue, New York.

This booklet gives details of their gas machine, and will no doubt be of interest to concerns or individuals whose home, store, factory or laboratory is located out of service gas mains, and will be mailed and who therefore cannot obtain the benefits, comforts and conveniences of gas, which is enjoyed by city people.

The Tirrill burners and gas appliances are scientifically constructed to burn air as well as gas, thus providing economical gas consumption. They can be used advantageously for any kind of gas—city, natural or gasoline gas, and will work under any pressure. The PATENT AIR MIXER, found only on these Burners, assures a saving of 25 to 50 per cent. of gas.

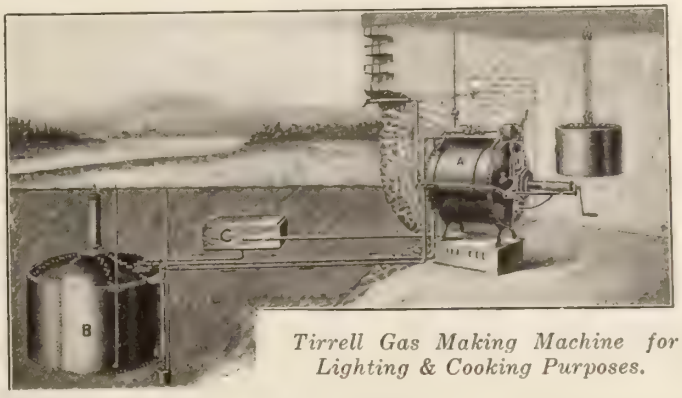
C. B. Owen, recently appointed Canadian manager of the United Electric Co., Ltd., who manufacture the TUEC stationary cleaner.

UNDER NEW MANAGEMENT

Another important change has recently been effected in the management of The United Electric Co., 159 West Richmond Street, Toronto. J. J. Martindale, who for a number of years occupied the position of manager, has been appointed to a very important position in the office of a large firm of efficiency engineers.

C. B. Owens has taken over the TUEC and is also the manager of the Canadian Powers Regulator Co. Mr. Owens started in the year 1911 in the construction department of this concern and was engaged in installing the power regulators.

The experience thus gained. has made him thoroughly capable of handling this line of goods. His company, under his direction, has installed a large number of their systems throughout the length and breadth of the Dominion and we feel sure that the new responsibility which Mr. Owen has assumed will not in any way suffer. Those who have become acquainted with him will no doubt join in wishing him all he may wish himself.



Tirrell Gas Making Machine for Lighting & Cooking Purposes.

BUSINESS TRANSFER

Wm. Harold Abbey, formerly in the employ of Messrs. Schaefer Bros., Simcoe, has acquired the business of his former employer. He is said to be a very able mechanic. The earnest desire of the Sanitary Engineer is that he will make good in his new position of responsibility.

LET'S KNOW WHAT YOU'RE DOING

The methods you employ in your shop, the "jobs" you are called upon to do may be peculiar to the nature of business predominate in your territory and your familiarity with it may make it commonplace to you, but to others not so well acquainted with work of that class may present real problems which would be simplified by an expression from you. Don't be backward, tell us and others what you are doing—the Sanitary and heating profession is growing very rapidly and the profession as a whole will be benefited by free and frank discussion of "jobs" and problems and their performance and solution—BE A BOOSTER. HELP THE PROFESSION BY YOUR EXPERIENCE. You can do this without it costing you a cent except postage, and we'll pay that if wou want us to.

NOTES OF INTEREST

Average wages paid during the summer months last year for male help on the farms of Canada, was $37.10 per month, while for the year the average was $341. The figures for 1914 were $35.55 per month, and $323.30 for the year.

Female help on the farms of Canada during the summer months of last year were paid on the average at the rate of $20.20, and for the year $200. In 1914 the amounts were $18.81 and $189.55.

Australia has adopted the policy of excluding the Germans from the base metal industries in that country. Excluding gold and silver, the yearly value of these products is about $45,000,000. Facilities for treating lead, zinc, and copper ores have been largely extended. All copper goods required in Australia will shortly be manufactured there.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

SEPTIC TANK FOR ORDINARY DWELLING

Editor The Sanitary Engineer.—Will you please make a sketch in your journal of a septic tank with dimensions most suitable for an ordinary dwelling.

How many feet of tile pipe required, etc.

A Subscriber, S.R.M.

Figs. 1 and 2 show the design of septic tanks which are suitable for dwellings.

The size is to be determined by the number of people residing in the house. Where there is a public water supply, i.e., where water is furnished as is the case in most cities, it would be well to allow at least 35 gallons, per person, this would be approximately 5 cubic feet.

If persons live in the house and use the plumbing fixtures constantly, it would be necessary to make a tank, which would hold 210 gallons or 30 cubic feet of fluid.

If however, the water has to be pumped by hand, it will be found that 15 gallons per person will suffice.

But if a pneumatic water system, operated by power, is used, then anywhere from 20 to 35 gallons should be allowed.

The size of the tank must be made with two compartments.

The dosing or syphon chamber is the one which must be taken into account, and not the first chamber into which the sewage from the house enters, the latter chamber is called the septic tank or settling chamber. It is in this chamber where the septic action takes place.

The dosing chamber is the one from which the discharge is made into the tile pipe.

In calculating the amount of tile required it is necessary to allow not less than 13 lineal feet of 4-inch tile pipe for every cubic foot of sewage which [illegible] per 24 hours.

There is first provided a main trunk line comprising of either 4 or 6-inch drain pipe, with a hub on every length of about 30 inches.

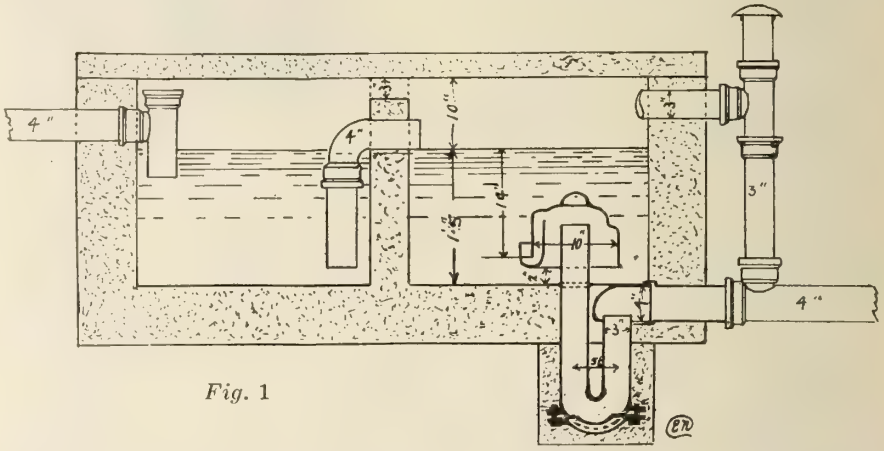


Fig. 1

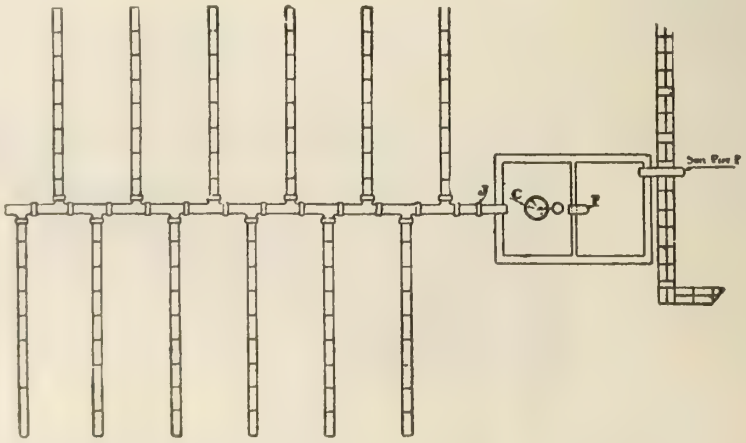
The joints of this piping should be made perfectly tight with oakum and cement, the latter to be mixed about the consistency of putty, and should be nearly level. The field tile should be laid either at right angles or at 45 degrees from the main pipe, and not less than three feet apart and should be laid almost level.

The joints should be about one-quarter of an inch apart, and stones, broken brick or gas coke should be laid around these open joints to prevent dirt from washing into the pipes. The pipes should not be more than 14 inches below the ground.

If the ground is inclined to be a mixture of clay and loam or sand, a bed should be prepared for the pipes so as to increase the absorption area.

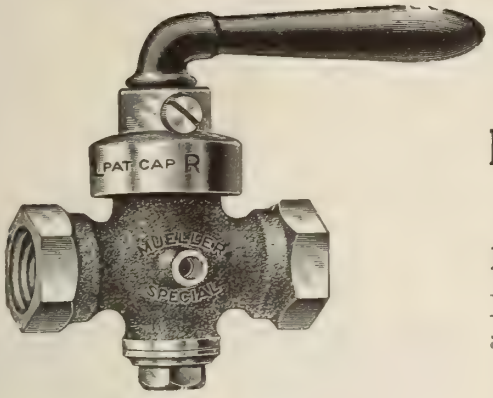
To prepare such a bed the trenches

(Continued on page 30.)



Typical installation of an absorption bed of tile pipe for small sewage disposal plant

Quality TRADE-MARK MUELLER REGISTERED Service



D6514

MUELLER

No. 49 Stop and Waste Cock

GROUND KEY WORK

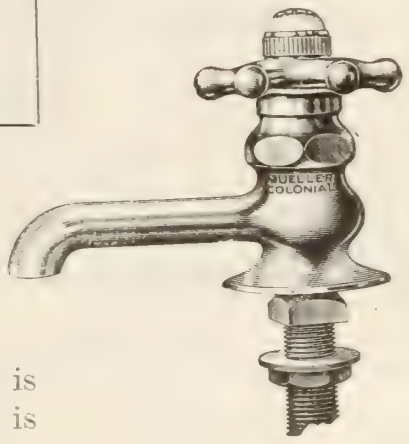
Mr. Sanitary Engineer, can you mention any piece of goods which requires to stand more real abuse than a stop and waste cock?

It is installed in the most important portion of the plumbing system and may not be operated for years. It is then called up at a minute's notice to "stop and waste" the whole system.

Mueller Brass Goods throughout are made of the best virgin metal money will buy. **Mueller Brass Goods** are the results of 58 years of practical experience. We test every piece before it leaves the factory to a pressure of 200 lbs. per square inch.

MUELLER

Colonial Self-Closing Work



12902—Patented

Mueller Self-closing Work is second to none. It is built upon scientific principles in every detail. It is beautiful in design and, like every piece of brass goods we make, is **unconditionally guaranteed.**

Made in Sarnia, Canada

H. Mueller Mfg. Co., Limited

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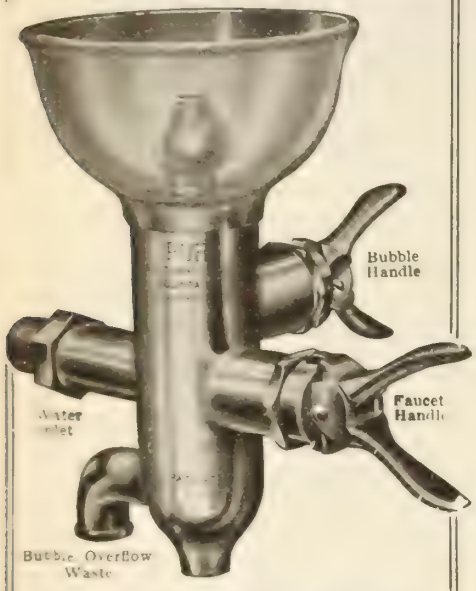
Makers of High-Grade Water Plumbing and Gas Brass Goods

PURO
(MADE IN CANADA)
Saves Dollars

Why let that old-fashioned faucet go on year after year wasting water—MONEY?

Why [illegible] wasting cups—and glasses, only to become [illegible] broken or carried away?

Puro Sanitary Drinking Fountain stops all this needless waste. Puro saves you 35% on the water bill alone. Puro saves you all that money [illegible] cups. YET Puro is always ready with a clean, cool drink with dollars in the bank.



Puro Pays for Itself

You don't have to wait years to get back the small investment you make when you put in Puro equipment—

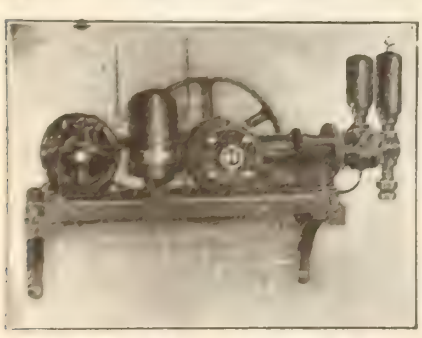
You start cashing in at once—not only on your water bill saving, but on the increased efficiency of your workers as well.

Men like PURO — it's clean. No danger of deadly germs lurking in its sparkling bubble.

Write us and tell how many men, how many departments, and we'll tell you how much the cost will be.

"PURO-FY"
YOUR WATER SUPPLY
Puro Sanitary Drinking Fountain Company
147 University Ave., Toronto, Canada

The Paul Electric Motor Pump



Every plumber and fitter should write to the Fort Wayne Engineering & Mfg. Co. (Dept. S), Fort Wayne, Indiana, and ask for Bulletin 403, which describes this power pump for residence service.

for the pipe should be dug about 2 feet wide and 2 feet deep, 6 or 8 inches of coke, broken stone and brick bats laid in the bottom. The pipes laid on top and the trench filled up with the same substance until about 12 inches of earth is laid on top.

If the dosing chamber is fitted with a Quinn valve, the tank may be operated at once, but if a syphon is installed to discharge the contents, it will be necessary to prime the syphon before placing the bell. If this is not done the dosing chamber will fill up and the sewage will simply dribble through.

This should not be. It is very essential to have the contents of the dosing chamber discharged intermittently into the sewage bed, or else some of the earth will become sewage sick. The earth requires to be rested for a period between discharges.—Editor.

COME OVERSEAS

(Suggested by the appeal of the 170th Battalion.)

Do you fear the Lord? Do you honor your King
Overseas?
Is your love for your home a sacred thing?
Come overseas!
When beneath the brave old Flag you stand
Do your eyes grow moist for the Motherland?
Are you ready to serve her with heart and hand?
Come overseas with us!

Have you caught the echo of Belgian grief
Overseas?
Will yours be a hand to bring relief
From overseas?
There are grey heads bowed in sorrow lone.
There's a King in exile, an empty throne;
Will you help to win Belgium back her own?
Come overseas with us!

Does your heart beat true for our own dear Land
From sea to sea?
Have you caught a vision of Empire grand
O'er land and sea?
Then there's work to be done that you can do,
And we'll make a place in the ranks for you:
Here's a hand and cheer for a comrade true!
COME OVERSEAS WITH US!

HELEN FAIRBAIRN.

FEDERAL HEALTH DEPARTMENT

(Continued from page 11.)

board. This board was composed of three competent experts from the army, the navy and from the Bureau af Animal Industry, to be associated with the director of the laboratory, and five additional members, to be nominated by the Surgeon General. The Act further provided for establishing research divisions of bacteriology, chemistry, zoology and pharmacology. The organization has made it possible to provide a large body of trained officials competent in every branch of public health work, not only to carry out the duties laid directly upon them by Congress, but also to be in a position to assist in the study of general problems which might affect the health, prosperity and commerce of the whole American people. In 1912 the duties of the service were further extended, and the whole organized into the Public Health service of the United States, with a surgeon general in charge.

The situation in so far as the Governments are concerned are very similar in both Canada and United States, and the conditions to be met are also so much alike that Canada may well, with the experience of the United States before her, consider in the light of that experience what her procedure may wisely be.

No duplication of work should be permitted. While the greater part of the health work now done in Canada is undertaken by the municipalities and provinces, the urgent problems of the future are wider than the mere provincial question; some of them are international. This being the case, it is proper to consider, having in view the changed conditions brought about by the discoveries of science, what is the duty of this Government in the highest interest of health of the whole people of Canada?

I referred a moment ago to the progress in recent years of medical science. Permit me to give some illustrations of this. I need only refer to the discoveries of Pasteur, Kosh, Lister, each of whom by his researches, the result of which are known to the whole world, has saved the lives of untold numbers of the human race. Previous to Koch's discoveries, tuberculosis was little understood, and the person who developed the disease faced sure death. But with Koch's remarkable discovery of the tuberculosis bacillus, a new note of hope rang round the world. In the last fifty years the mortality from tuberculosis in Britain has in the mind of the student of medical science fallen 50 per cent. and there exists to-day a sure belief that with time and care tuberculosis will be a rare disease.

(Continued in next issue.)

MORRISON BRASS VALVES

Morrison Valves are especially adapted for service where the requirements are severe.

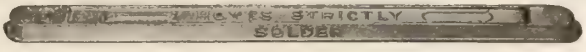
They are renewable disc valves, with heavy bodies, spindles and valves, and fitted with gland follower in packing nut.

It is impossible to produce a better line than MORRISON BRASS VALVES.

Full information and prices furnished upon request.

The James Morrison Brass Mfg. Co.,
LIMITED
93-97 Adelaide Street West, Toronto, Ontario

Our Mixed Metal Sales Amount to Over $5,000,000 Annually



We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

Your orders will have prompt and careful attention, not sometimes—but all the time.

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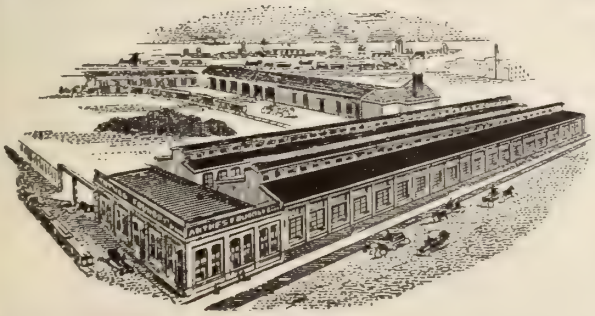

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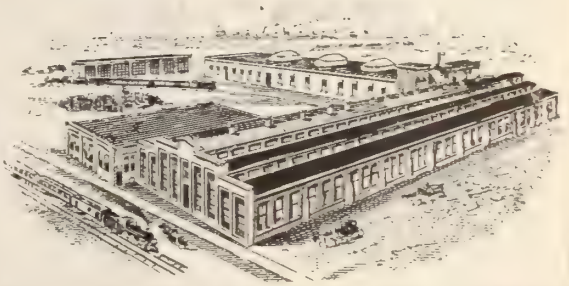

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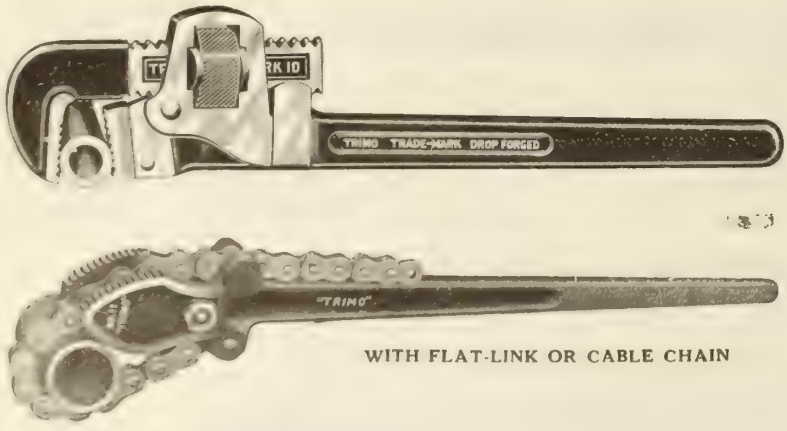

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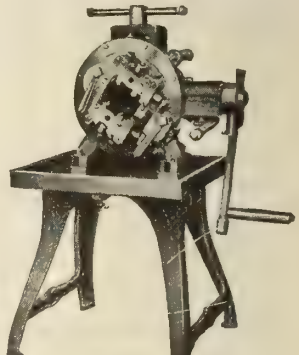

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Either Hand or Power

This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
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Manufactured by

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BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
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ALSO NIPPLES Black and Galvanized All Sizes

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Water Supply, Sewerage, Sewage Disposal of Cities, Villages and Institutions.

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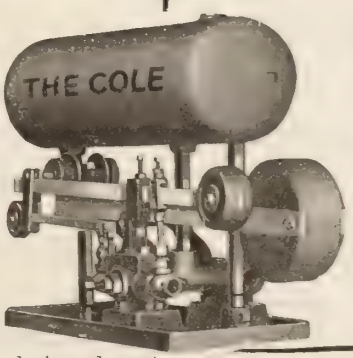

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They work with the utmost in efficiency and reliability, and return condensation at any pressure.

Operate on roller bearings, on a fixed Fulcrum which permits of full discharge at each operation.

Mr. Steamfitter, why not get in touch with US?

GEO. W. COLE CO.
838 Dundas St., TORONTO

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Hoyt Metal Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Mixing Valves.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Co., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Monkey Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Nipples.
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Canadian Tube & Iron Co., Ltd., Montreal.
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IF that *same coupon* pointed to a $50.00 bill, it would hardly be of more value than the message it will bring you if filled out and returned to-day. That coupon will show you how to turn your spare time into golden dollars. Better fill it out and send it to us, hadn't you? Don't allow this opportunity to get away.

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DART Union Pipe Coupling

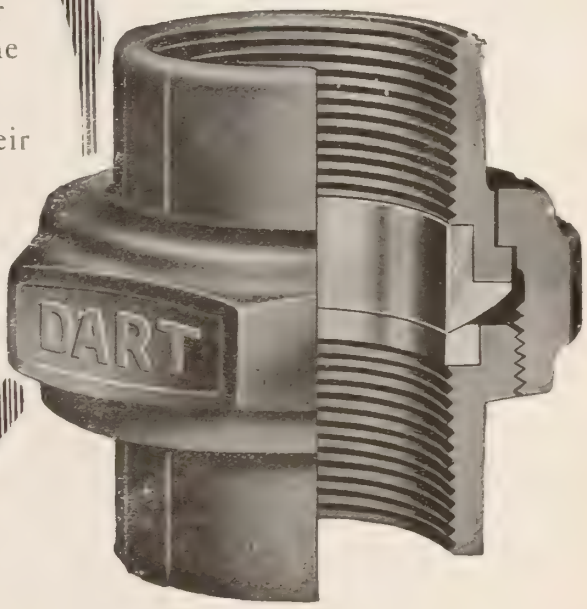
The kind that leaves no room for complaints and saves time

BRONZE to BRONZE at the Joint

You'll never be called back to right a leaky joint at your own expense if you use the Dart Union Pipe Coupling.

When once made tight they stay tight because their faces are of bronze which, you know, **cannot rust or corrode,** and the extra heavy iron parts will withstand all stress and strain.

The "Dart" is easily and quickly connected whether pipes are in or out of alignment.



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Kerr Radiator Valves and Union Elbows

for Steam and Hot Water Heating Systems, possess the proper staying qualities. They are not only up to the minute in appearance, but are there with the quality under the polish and nickel. If you have been in the Heating business any length of time, you should be familiar with KERR valves.

WORKS AT WALKERVILLE, ONT.

If you are new at the game, we invite you to "get wise" to this line of valves. Our catalogue No. 5, is yours for the asking.

You don't experiment when you buy Kerr valves.

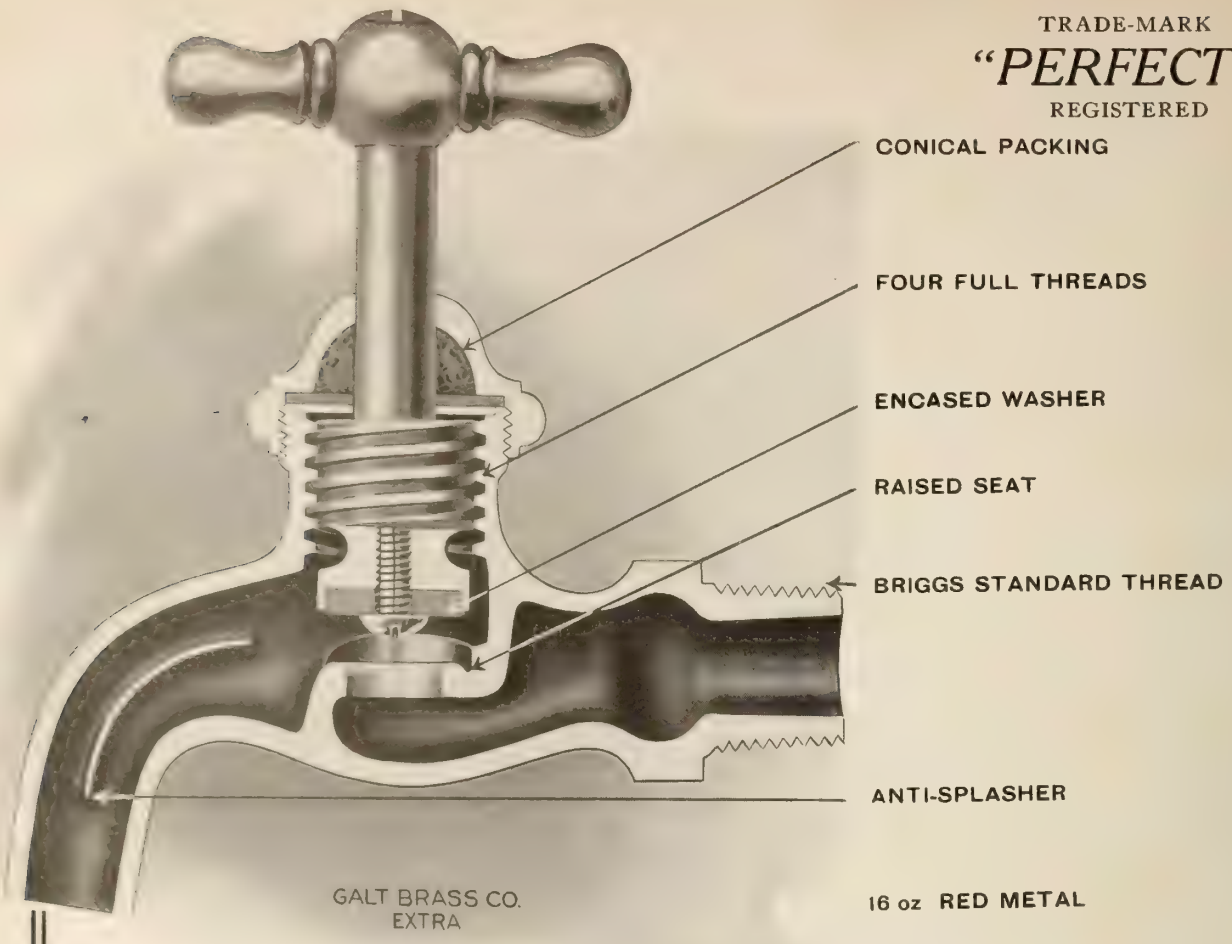
We paid for the experiments long ago.

The Kerr Engine Company

LIMITED

WALKERVILLE - ONTARIO

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

ANNUAL SPRING NUMBER

THE SANITARY ENGINEER

PLUMBER & STEAM FITTER of CANADA

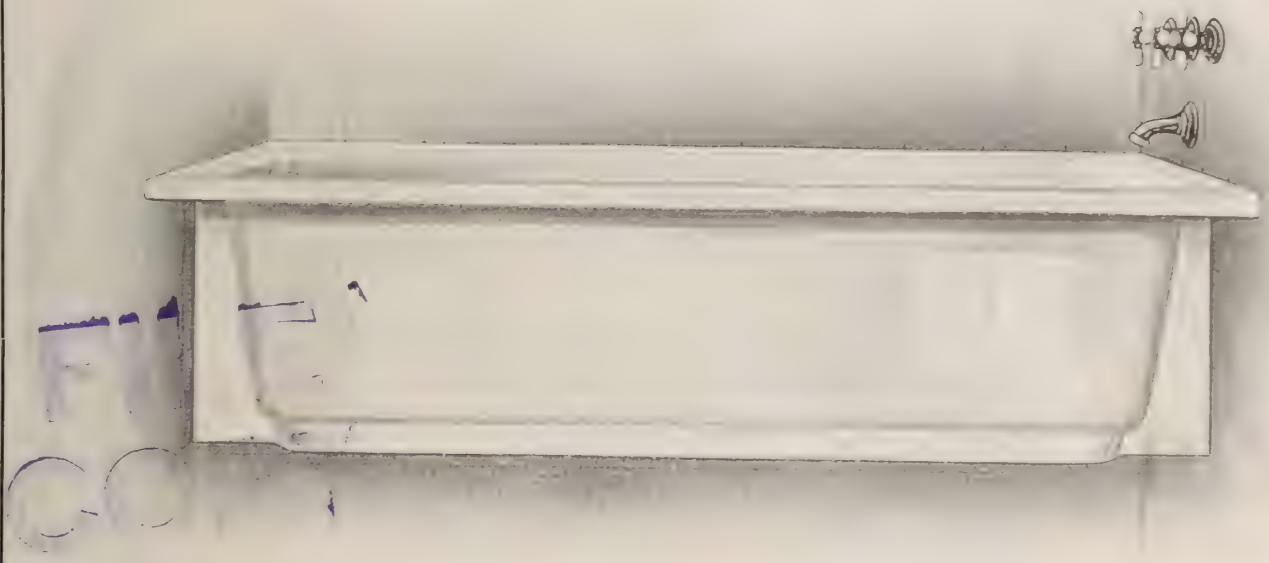
THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol X. Publication Office: TORONTO, APRIL 1, 1916 No. 7

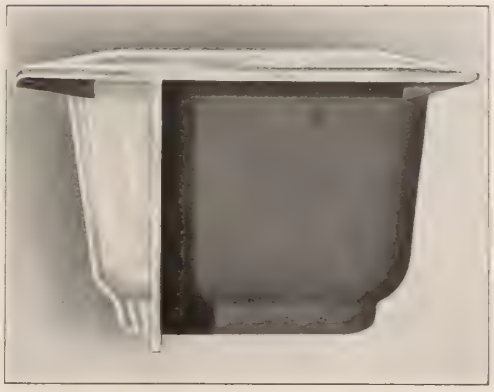
Enameled All-over

VICTOR ONE-PIECE BATH

Enameled Inside



The principle of the Victor Bath is a tub body cast integral with a Base and Wing Plates: the latter in various positions on the Tub Body to make the various Combinations, viz.:



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Also with Extension Rim at End or Back for fittings—thru rim.

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Cast Iron Enameled Ware

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Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability

Ask your jobber for BEAVER BRAND CAST IRON ENAMEL WARE
and build up your reputation

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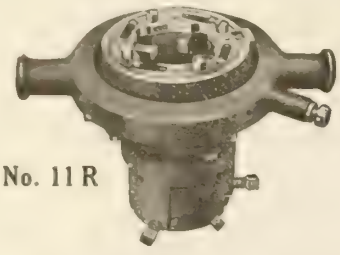
Reduce the labor of pipe threading 50 per cent. and make threads as clean and perfect as if cut on a Lathe with only ONE cut.



No. 11 R

"Jardine" Adjustable Ratchet-Threading Tool

Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely enclosed, excluding chips and dirt.

"Jardine" or "Toledo" dies spare the muscle of the man who does the work, and save money for the man who pays the wages, as they enable one man to do the work of two and cost less for repairs. No cams or jimcracks to wear and get out of order. Cutters that cut, don't squeeze. Set of cutters for each size of pipe. Lead screw ensures perfect pitch and form of threads. Adjustable to all variations of fittings, very durable cutters.

IS NOT A TOOL LIKE THIS WORTH YOUR CLOSEST INVESTIGATION?

We'll be pleased to put you in touch with users and send catalog. Write!

All threads finished at one cut. One man does the work of two.

MADE IN CANADA

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—He's a Poor Workman

who complains of his tools, as a general rule. But he's a poorer workman who, knowing his tools are inefficient, does not complain.

Educate your men to turn in their files the moment they reach their "inefficient point." That will give them no excuse for poor work.

The cost of the extra files will be much less than the loss in labor, time and mental energy spent in using files that have worn smooth.

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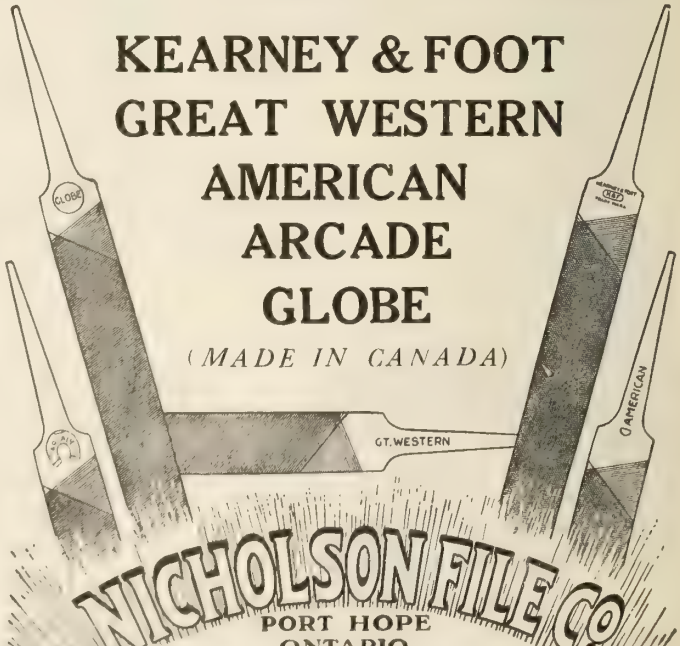

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The Most Popular Boiler Made

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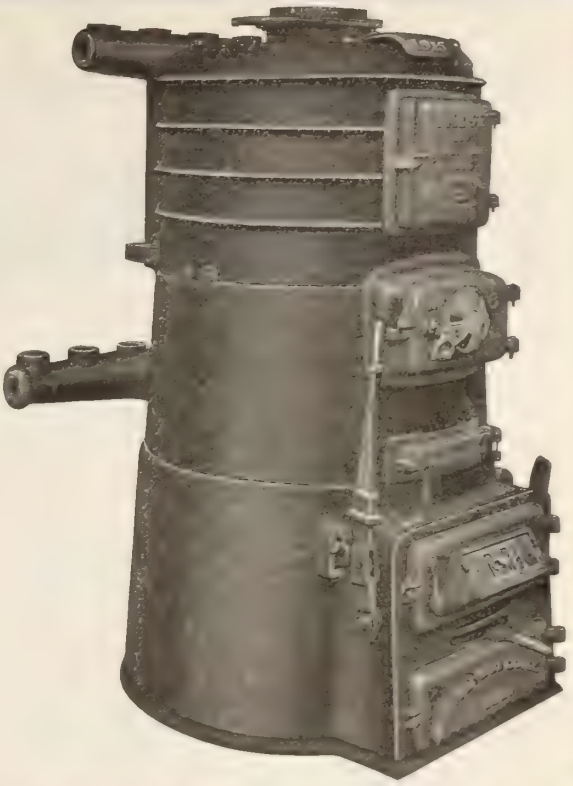
Every installation means a satisfied customer.

Minimum consumption of fuel.

Maximum amount of heat.



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—Guaranteed—

The ball with the reinforced top which makes elongation impossible.

Made of the finest rubber and will outwear three ordinary tank balls.

Our full line of Quality Rubber Goods are at your command, and if you want to give satisfaction all the time, use only Wolverine goods.

Canadian Wolverine Company

Limited

CHATHAM, ONT.

What do you know about the

Presto Heater?

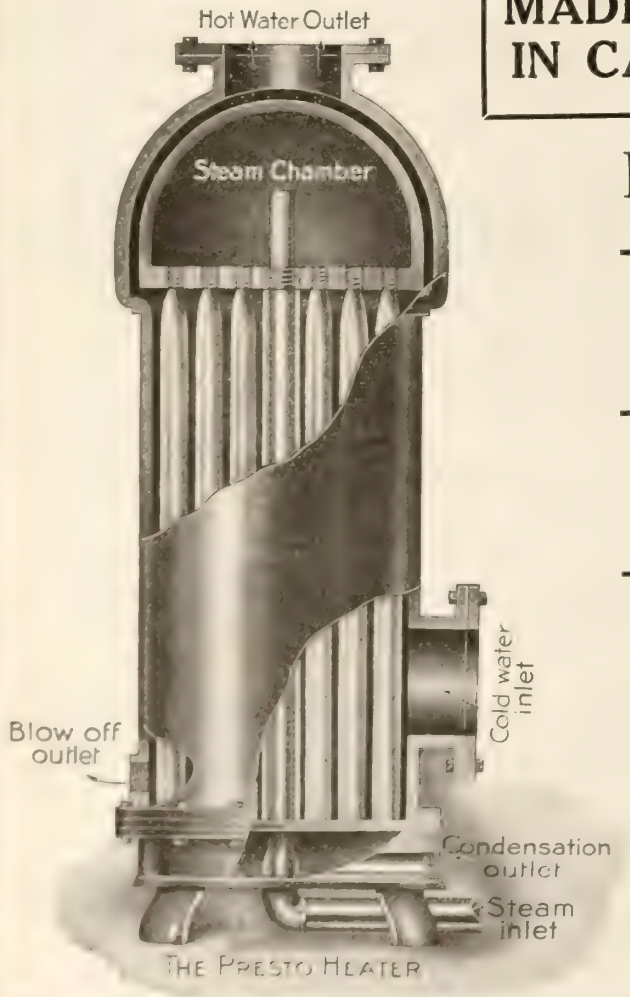
Do You Know

—that it is the most efficient heater in the market?

—that it is guaranteed to effect a saving of at least 25% over any other heater on the market?

—that we stand behind this guarantee?

MADE ONLY IN CANADA



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—that many heaters of other makes have been replaced by "Prestos"?

—that no Presto Heater has ever been replaced by another heater?

—that there is not a single Presto user who is not completely satisfied?

—THAT IT IS TIME YOU WROTE US FOR FULL PARTICULARS?

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Clark Temperature Booster for Hot Water Systems Described in Bulletin "A"

There Is No Argument

It Is A Fact

Water at the sea level boils at 212 deg. Fah., while under a pressure of 15 pounds to the square inch it will not boil until it reaches 234 deg. Fah.

THE CLARK TEMPERATURE BOOSTER FOR HOT WATER HEATING SYSTEMS puts a pressure of 15 pounds to the square inch on the system and makes a gain in heat and circulation.

PUT A CLARK TEMPERATURE BOOSTER ON YOUR NEXT JOB, and make a pleased customer, a better job and satisfaction for yourself. Everybody pleased.

LOOK AT THE SAVING. SMALLER PIPING, SMALLER FITTINGS, SMALLER VALVES. EASY TO INSTAL, EASY TO CLEAN OUT IF NECESSARY, AND ABOVE ALL, IT DOES THE WORK.

Made in Canada Only

Hundreds of Satisfied Customers

We want every steamfitter in CANADA to have a Booster in stock, and to this end we want you to fill out the coupon below and mail it to us for a trial order.

THIS IS A MIGHTY LIBERAL OFFER

The price of the Booster installed on the job is $20.00, and shows a handsome margin for the steamfitter.

TO THE W. E. CLARK COMPANY, 28 ADELAIDE STREET WEST, TORONTO, ONT.

Gentlemen:—

Please ship to me per.....one CLARK TEMPERATURE BOOSTER (all brass), on your usual terms, nett 30 days, on the understanding that I may remove same from the job and return to you and receive a refund of purchase, plus freight, any time within six months, if it does not do what you claim for it as advertised.

Signed.....

S.E.

Town.....

Street.....

Date.....

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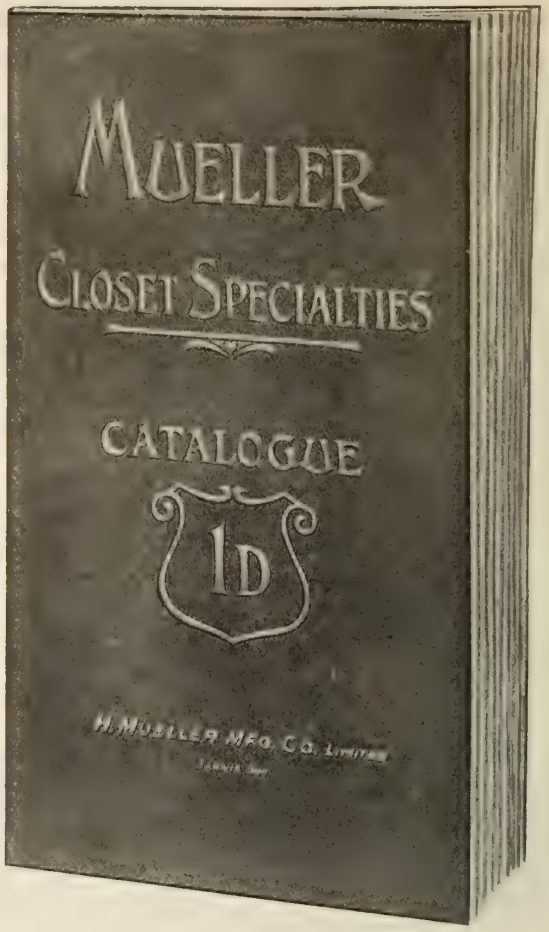
It is truly a Pocket Salesman

It will help you to bigger and better business



Actual size—5½ inches by 9 inches.

On the opposite page we show a few examples of the articles shown in this catalogue.

We would call your particular attention to Plate No. 1505 Regal Combination, the Tank of which is shown separately under Plate No. 1755. This Tank is constructed of *"Armco" Ingot Iron,* heavily enameled and fully guaranteed. These Tanks are fitted with our *Patent Anti-Sweat Linings* which eliminates entirely the *Sweating Nuisance* so common with this type of Tank. The Fittings in all of our Tanks are the *"Hydraulic" Flush Valve* as shown under Plate No. 1850 and our *D25510 "Rapidac" Ball Cock,* the Tank fittings without parallel.

Send for a copy of the Catalogue and get the full description. We assure you it will pay you to do so.

FILL OUT THE COUPON ATTACHED AND MAIL TO US.

H. Mueller Mfg. Co., Limited,
Sarnia, Ontario

Please send a copy of No. 1D Catalogue to

Mr. .....

H. Mueller Mfg. Co. Limited,

SARNIA, ONTARIO, CANADA.

Makers of High-Grade Water, Plumbing and Gas Brass Goods, and Jobbers of General Plumbing Supplies.

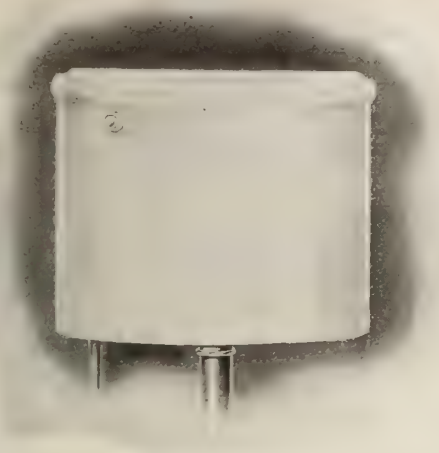
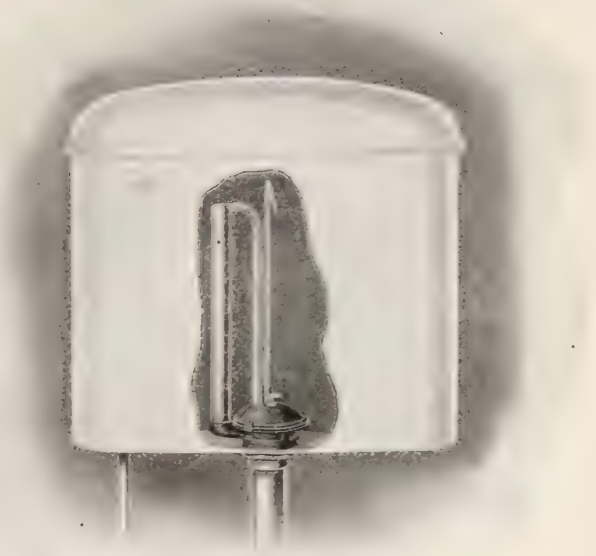


PLATE No. 1755

Enameled "Armco" Tank. This Tank is a model of Tank Perfection and with it installed "you have Comfort" on tap 24 hours a day.



The illustration above shows how the "Hydraulic" Flush Valve is installed in the Enameled "Armco," or any other Tank. No nickel-plated parts show on the front of the Tank to get tarnished. The simplicity of the action of the "Hydraulic" is apparent to observers of ordinary perception.

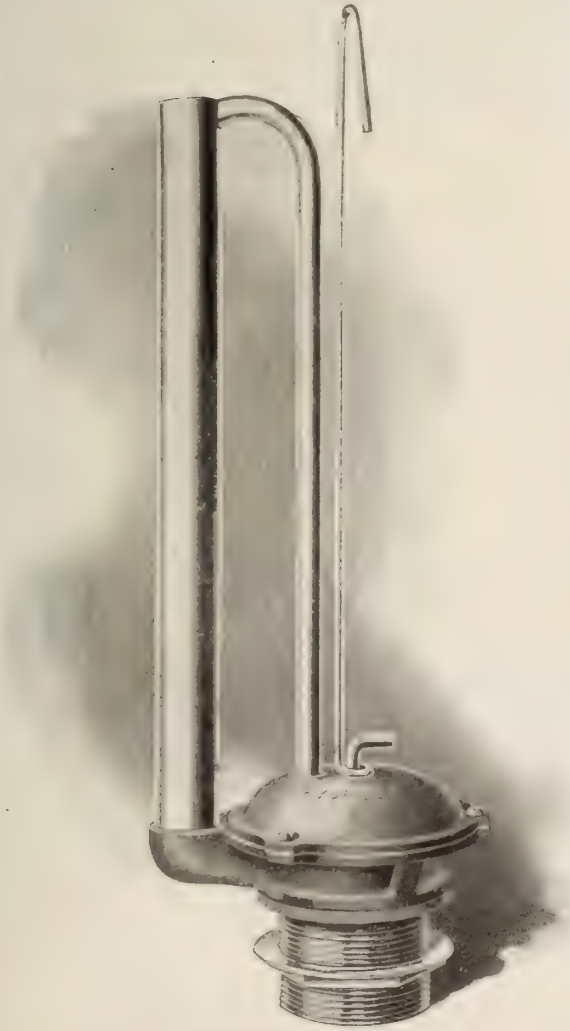


PLATE No. 1850

"Hydraulic" Flush Valve for Lowdown Tank with 2" Connections. This Flush Valve will fit any Tank. This is the Flush Valve that has no equal. A trial order will convince you that we are justified in our enthusiasm.

PLATE No. 1505 "REGAL"

The "Regal" Combination is without doubt, the best of its kind. If you wish to make and retain new friends, your best policy will be to adopt this as your standard outfit.

H. MUELLER MFG. CO., Limited, Sarnia, Ont., Canada.

Makers of High-Grade Water, Plumbing and Gas Brass Goods, and Jobbers of General Plumbing Supplies.

The Thousands of

Spencer Boilers

now in operation throughout this Continent prove conclusively that the Spencer is a wonderful success as a heating apparatus.

Thousands of SPENCER SELF-FEEDING BOILERS have been successfully operated during the past winter in various types of buildings, ranging from the job of 600 feet of water to very large steam jobs, and all working on the same principle, giving the same results, viz: from six to twelve-hour service without attention, keeping constant temperatures on the building, burning the grade of anthracite coal, that is sold for from $3.00 to $4.00 per ton less than the regular sizes, and burning fewer tons because of the fact that the magazine of the boiler contains sufficient quantity of this coal to operate the boiler for twenty-four hours. This coal feeds over the arched grates in thin fires, in exact proportion as consumed, thus establishing a constant service, which feature is unknown to any other type of boiler.

Every owner of a SPENCER BOILER is enthusiastic in regard to his heating apparatus, and, the owner of the first SPENCER BOILER in your district, will assist you in closing many future sales. You will find that the prospective purchaser of a heating boiler to-day is just as anxious to secure the latest model of a boiler, as he proves to be in regard to buying an automobile, and very few business men, if any, at this age, are interested in last year's models of cars, and why should they be in regard to old type boilers?

Demonstrate this fact for yourself to the next prospective purchaser you have, by explaining to him the construction and merits of the SPENCER BOILER, and you will discover that the heating business is not conducted on the price policy only, any more than with any other business, and the first installation of a SPENCER BOILER in your district will convince you that it pays to be progressive.

We are pleased to refer all enquiries direct to the heating trade as a result of our wide campaign of advertising to the owners, and we are anxious to co-operate through the trade only. We will gladly send you full data concerning SPENCER BOILERS and their operation; also our lists of installations in Canada, to whom you can refer direct. It will pay you to have this information to hand.

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Morehead
Back to Boiler
SYSTEM

60,000,000 Tons of Coal Thrown Away Yearly

Over 600,000,000 tons of coal are mined yearly in the United States and Canada. Ten per cent. of that enormous production is carelessly, needlessly wasted. Over Sixty Millions of Dollars are spent each year in producing—nothing, and yet, a mere fraction of that great loss, if properly applied, would save those wasted millions for years to come.

You are contributing to this national waste—but you can stop it.

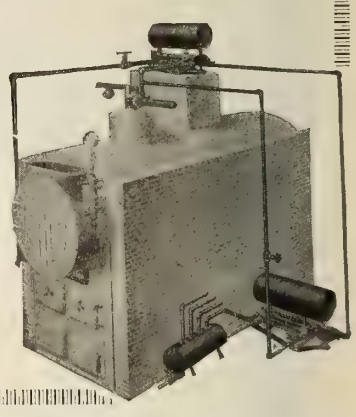
Steam, after its expansive energy has been exhausted, is not through with its job. There are heat units left—live, tangible heat units which were purchased by coal at the boiler's mouth.

What are You Doing with These Heat Units?

This condensation, in other words.

With the Morehead System installed on your steam lines the condensation is automatically returned to the boiler—without pumps—and at any temperature. It is the last link from boiler back to boiler—the unused energy is not wasted.

If you would save this ten per cent. and have a clear steam system which drains automatically, write to-day for particulars.



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"The Dunham Way"

The Heating with that almost human manner of keeping the house at an even temperature regardless of weather changes. With that simple ease of operation so desirable in home heating.

The Heating without those sputtering, sizzling air valves on the radiators. No pounding, cracking noises in the piping during the early morning hours.

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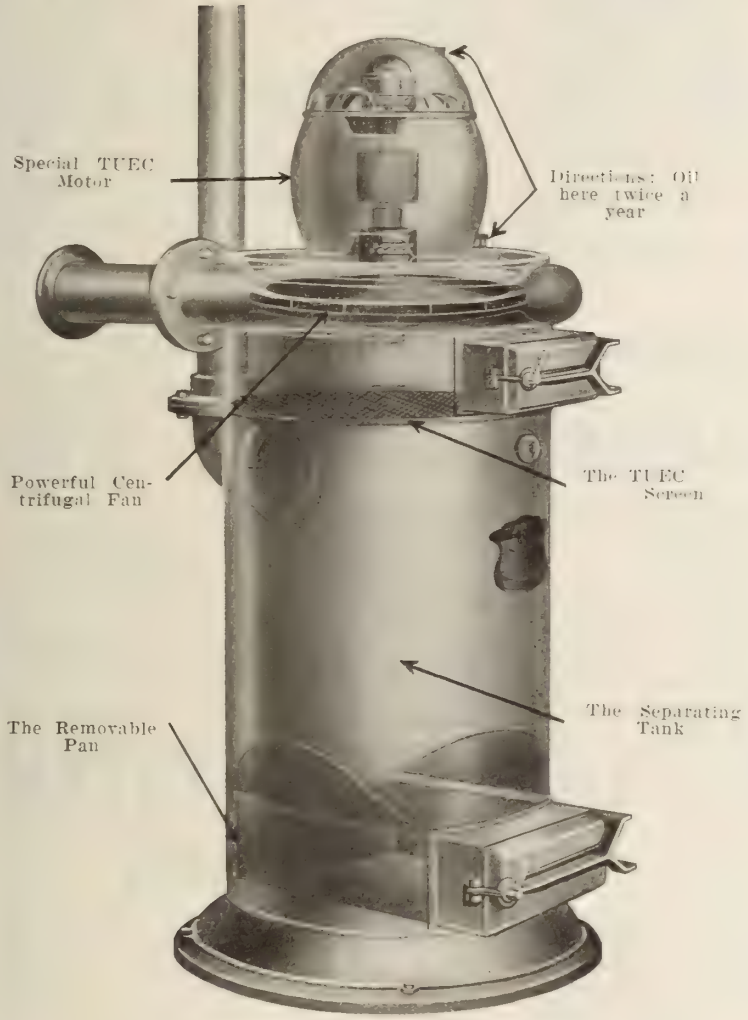

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TUEC Stationary Cleaners are without competitors. They are in a class by themselves.

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QUATURN
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BULLETIN No. 13

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GAS FIRES, Etc., Etc.

are greatly in demand at this season.

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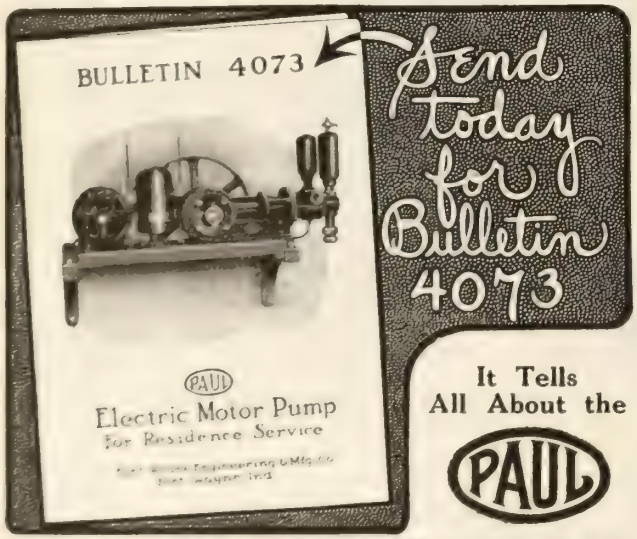

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Main Office and Factory: Fort Wayne, Indiana
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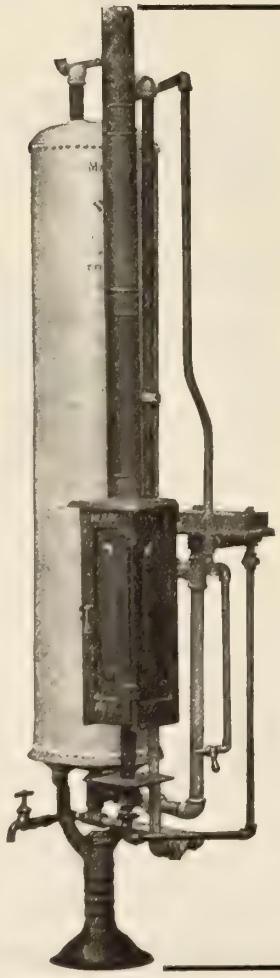

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Generates and maintains a predetermined pressure without the use of springs, valves, weights or mechanical parts.

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Easy to connect and requires no attention after installing.

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SANITARY ENGINEER
PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, APRIL 1, 1916 No. 7

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EDITORIALS

Coming Conventions—No Time to Read Trade Papers—Price Maintenance —Deceiving the Public.

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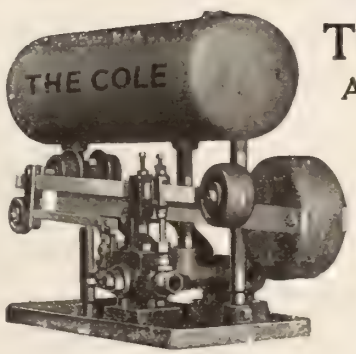

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No. 112

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AGENCIES IN ALL LEADING CITIES

THE SANITARY ENGINEER

VOL. X. APRIL 1, 1916 No. 7

The Evolution of the Trade Paper

The Old Time Paper and the New—Interests of the Retailer the First Consideration—Service the Keynote of Success—The Trade "Bible" of the Live Merchant.

Written for The Sanitary Engineer by C. J. Morris

THE trade paper is without doubt slowly but surely coming into its own. Each year sees it making headway towards the attainment of that position in its own particular trade to which it is indisputably entitled. Time was—and it is not so very long ago—when the support extended by the members of a trade to its own particular journal was handed out in pretty much the same way and with about as much enthusiasm as would be manifested by the tradesman in subscribing to some local charity, to which he felt it would be impolitic to refuse his aid. He handed over his dollar or two a year and expected to receive about as much in return, or perhaps rather less, than he would expect to get from having his own trade ad. appear on the back of the program of some local concert. That it would be possible for him to get from the paper a return of ten or twenty times the value of his subscription never for one moment entered his head. Had he been asked his reason for subscribing he would probably have said that he felt in a way bound to support a paper associated with his own trade; that he could not very well refuse, and that after all the amount was only small.

This attitude on the part of the retailer was to some extent in many cases no doubt justified by the lack of the trade paper itself to fully appreciate its own capacity for service and by its inability to perceive what a splendid scope was open, for the exploitation of innumerable fields and methods of assistance, both to the retailer and to the wholesaler, to the trade pioneer who placed before himself as his one object to be steadfastly pursued the general amelioration of the conditions of that particular trade or calling to which his paper catered.

In days gone by the first consideration on the part of the man about to launch a trade paper was not, "Can I issue a paper which will be of real service to the trade?" but "If I start my paper can I rake in enough advertisements to make it pay?" The fundamental idea was, not to build up such a paper that every member of the trade would feel he could ill afford to lose the service it rendered, but to make sure of a volume of advertising sufficient to cover expenses and leave a profit; and to secure this end the principal requisite was considered to be a good staff of advertising salesmen.

It is not contended by this that a paper can now be run without advertising nor that the successful advertising salesman is not the indispensable concomitant of the successful trade paper, but it was not fully recognized that unless the paper could justify its existence on the ground of services rendered it must eventually go to the wall or at best eke out a hand-to-mouth existence, relying upon new advertisers to replace those who discovered or who considered that the returns from their advertising did not justify the continuance of that advertising. The old-day trade paper pioneer recognized only that advertisements were necessary to his existence, the present-day man knows indeed that his success depends upon securing advertisements but he perceives in addition that before he can secure those advertisements he must first make his paper such that the advertiser will be actually missing business should he fail to advertise.

Now what has been the result of this change of viewpoint on the part of the trade paper proprietor? It has resulted principally in his laying himself out first and foremost to be of service—not to the manufacturer from whom he secures his advertisements—but to the retailer, the man by whom those advertisements will be read. True, he knows that in doing this, in making his paper indispensable to the retailer, he is thereby rendering the greatest possible service to the advertiser, but his basic thought now is: "What can I do to make my paper more attractive to the retailer? How can I make every member of the trade a subscriber to my paper, so that the advertiser will feel he cannot afford to dispense with it as an advertising medium?"

It thus has come about that the trade and technical paper nowadays is always on the "qui vive" to hit upon new methods and devices to be of service to its subscribers; not from any philanthropic motive, be it understood, but simply as the most effective means to the desired end of seeing itself regarded by manufacturers as the finest and most sure medium of introducing their goods to the trade.

No effort, therefore, is neglected, no opportunity is let slip, of utilizing every means to increase its serviceability to the trade, to whose support fundamentally it must owe its success. The best business writers are engaged, efficient service bureaus are instituted, which are ready and eager at any time to supply information or render any other service that may be demanded, and this, free of charge. One trade paper recently has instituted a service of supplying cuts for insertion in newspaper ads. at cost price.

Thus it is that never before in the history of trade journalism is the trade journal of such signal service to its readers as at the present time. The live business man knows this, and would, as soon think of dispensing with his trade paper as with his store front or his account books. He realizes that the nominal cost is but as a drop in a bucket of water compared to the benefit he can derive from a perusal of its pages. Frequently it happens that one idea gathered from it is worth more to him than many years' subscriptions. He can enjoy the advantage of the experiences of other merchants, their methods of dealing with accounts, with credits, with stock; and a hundred and one other items of information are at his service which he could secure in no other way. Small wonder is it then that the trade paper is becoming by many to be regarded, as one man aptly put it a few days ago, as their trade "bible."

"Gas Talks" to Sanitary Engineers

Spring-Time is Opportunity Time for Sanitary and Heating Engineers. Gas Appliances are Already Half Sold. A Little Initiative on the Part of Sanitary Engineers Will Bring Final Results

Written specially for the Sanitary Engineer by E. M. Paterson, Consumers Gas Co., Ltd., Toronto.

WITH the going of the snow the housewife's thoughts naturally turn to those awful and wonderful operations known as "Spring Cleaning". It does not matter how careful the housewife is in the every day cleaning and dusting, there is always a certain amount of dust and dirt accumulated, for the most part in almost inaccessible places, and knowing this to be the case every article of furniture is thoroughly cleansed and every atom of dust is chased from the dwelling.

During and following these arduous labors it is only natural that the housewife's thoughts should wander continually to every possible preventative against this seemingly inevitable accumulation of dust and dirt. This is the sanitary engineers' opportunity. It is a well known and established fact, that wherever gas appliances are used in the household, dust and dirt are more or less banished and house cleaning con,-siderably lessened.

Where coal has been used for cooking, the suggestion of replacing the cumbersome and dust producing coal stove with an up-to-date gas range, will almost invariably be appreciated by the housewife. She will be only too willing to listen to a proposition which tends to lessen her labors in the future. The idea of being able to cook without the overbearing heat from the coal range will appeal to her; the proposed absence of coal carrying; ashes sifting and continuous dust will help to soothe her tired nerves.

The sanitary engineer who advocates such an advantageous change at the psychological moment, will undoubtedly be invited to enter into fuller detail, and in nearly every case the sale of a gas range should result. When the need of banishing all the dirt and dust possible, is so fresh in the lady's mind, her recent experiences during spring cleaning having enforced the need of some drastic change—a timely suggestion cannot fail to interest, and who is better able to make the suggestion than the sanitary and heating engineer? His every day experience has taught him the necessity of cleanliness, his working hours are spent in installing necessary applies to aid sanitation and cleanliness. Here is a golden opportunity for him to further the good work. The [illegible] is the frame of mind necessary, and is ready to investigate and [illegible] the advice of the sanitary engineer. All that is wanting is the actual suggestion to come from someone entitled to speak from knowledge and experience. Surely this is too good an opportunity to be let slip.

It is quite easy for the Sanitary engineer to connect up with those of his customers whom he knows to be still using the antiquated coal range for cooking. The little trouble that is entailed is amply repaid by the increased business that will doubtless ensue. Every gas range or other appliance sold and installed means continued additional work for the sanitary engineer. The work does not end with the actual installation, every gas appliance needs a certain amount of "Professional" attention in order that its efficiency should be kept up. The sanitary engineer's interest in the gas appliance should not end with its installation, but should continue, if possible, while it is in use. Whenever he has occasion to enter a home where hs has installed a gas appliance a little judicious enquiry or inspection will not be out of place. Small attentions of the kind are not as a rule lost on the average client, but often pave the way for further sales and installations. It is quite easy to lessen the efficiency of a gas appliance; generally this is done inadvertently. Sometimes when the parts have been cleaned they are not replaced correctly, occasionally the air mixer is altered by accident producing incomplete combustion, etc., etc. These minor, but very necessary details, do not take many minutes to put right, and timely attention to them will certainly help to increase the prestige and ultimately the trade of the sanitary engineer.

Useful gas appliances are increasing in number every year, improvements are constantly being made in design and construction, tending to produce greater efficiency and economy in consumption.

There is an enormous field for the sale of really efficient gas water heaters in every district where a supply of gas is procurable. The sale and installation of gas water heaters can be made a very important and profitable part of every sanitary engineer's business by judicious fostering and studying their customers' needs.

A very important invention which has been perfected recently is the Thermostatic Control applied to small and inexpensive storage systems. Where a constant supply of hot water is necessary and conditions do not warrant or permit the installation of an instantaneous automatic water heater, thermostat controlled storage system used in connection with a 30 or 40 gallon tank will often be found to meet the requirements, and the cost of installation the pocket of the prospective customer.

There is no more convenient method of heating water than by gas; little or no waiting, and no waste of fuel. The continuous and uninterrupted service accompanying the use of gas is a great factor in its preference by the householder. Where gas is used for cooking and water heating, the inmate can cultivate habits of punctuality, and regularity, with far greater success than where coal is used. Mother knows the exact time it is necessary to start preparing meals in order that other members of the family can start for their daily avocations on time. Father knows that his bath and shaving water will be ready at a certain time, and makes his plan accordingly. The orderly and punctual city household is almost invariably found to be a "Gas" stronghold.

All these facts help the sanitary engineer to sell and instal gas appliances.

Then there is the gas fire that also is calculated to gladden and brighten the home in spring time. Chilly nights and mornings call for some heat and householders are loth to light the furnace once they let it out, and the cellar cleaned up. The modern gas fire creates no obnoxious odor or dirt, it radiates heat the moment the gas is ignited. It can be dispensed with at any moment and no fuel is wasted; an ideal fire for spring use. Every sanitary engineer should make a point of studying conditions governing the use of each gas fire. The up-to-date radiant gas fire is an enormous improvement over the asbestos wool covered grate, and proves its value from the first day of use.

Another gas appliance which can be shown with success at this period of the year, is the gas heated water still. By using this still, distilled water can be obtained at a cost of 2 cents per gallon. Who would not drink pure water if they knew it could be obtained at such a small cost?

Only a few gas appliances have been mentioned in this article. There are numerous others for which the demand is strong in the spring time.

An Address by the President

President E. H. Russell Tells the Readers of The Sanitary Engineer What Association Work Stands For. He Shows in a Very Concrete Manner That No Man Can Live Alone. In Home Life and Business Man Must, to be a Success, Associate With Men With the Same Common Interests

THE fundamental principles of association work are admirably and tersely put in the opening clause of the By-Laws of the Ontario Society of Domestic Sanitary and Heating Engineers:

"That we may create and foster feelings of fraternity and social intercourse amongst members of the craft and, in addition, promote the follow-special objects, viz.

"The advancement of the trade in its sanitary heating, mechanical and scientific departments;

"Protection against imposition, injustice or enroachment upon its common rights and interests:

"The encouragement of the educational and inventive talent of the members of the trade generally;

"The dissemination among the public of a true knowledge of sanitary science and principles;

"The growth of amicable relations between the public and members of and trade and

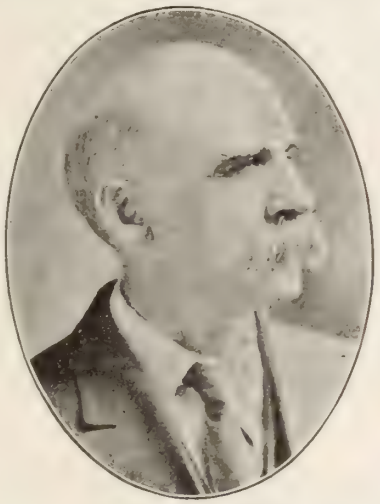
"The mutual welfare and benefit of such members of the Society as may be in need of same."

These objects seem so eminently desirable, that it is difficult to understand how any live member of the craft being aware of the existence of such a society, can neglet to become a member, and it is with the assumption that there are some who do not know the objects the Society has in view that this article is written.

The usual young man making a break for himself can but use the knowledge of his previous training as a workman, plus a certain amount of reading up for his new venture. Eager and willing, he proceeds to work as he never worked before, and he soon discovers that as workman, book keeper and collector, he is working about all the hours there are. His newspaper advertisements bring him clients, but he does not know that many of these, like Dick Swiveller, have only been waiting for a new victim. When he does realize this it will take him much longer to find out that there are at least three kinds of business he should leave severely alone if he would have money for a vacation.

Having little idea of relative values, overhead expenses and the hundred and one things that must be provided for his contracts are taken at net cost of material, and he charges labor at what he received per day as a journeyman, plus ten per cent. for profit. He will discover later that some of his contracts were obtained owing to his leaving out something. Having no price list or price book, his charges and cash sales carry about the same margin, and at the end of the year he is astounded to find that his assets and debts about balance, less a heavy sum of money due to him for his own salary.

Being thus brought up short, he decides he must be more careful and incidentally get a little more money for what he is doing, and being something of a thinker he perceives that there are but two sources from which his living must come, viz., the surplus from his



E. H. RUSSELL
President of Canadian Society of D. S. and H. Engineers.

labors, or the manufacturer who supplies the goods. His reflections are not altogether pleasant, but, being naturally optimistic, he feels he is definitely in the game, has become fairly well known, and, while he has not made any money, his year of hard work has given him some experience. He therefore, continues, possibly employing more labor, but he is still book-keeper, collector, and, on occasion, workman. In far too many cases he remains always on the ragged edge, living alternately on his meagre profits and on the supply man, till an extra turn of bad fortune, or Father Time gather him in, unhonored and unsung.

Should some think this picture is overdrawn, I can but refer them to the various credit agencies and I could furnish some reports thereon myself. In the meantime and before it is too late, let us find a way out of the difficulty.

Will reading do it? Well, to take up some of the magazines and read how to become a lawyer or almost anything else you care to mention, by returning the coupon now, and devoting fifteen minutes per day to the object of your desire, nothing is so easy, and, if it were only true, this North American Continent would have produced before now a race of physical and mental giants such as the world has never known. The real fact is, however, there is only one way to learn to do business and that is just the same way that he learned his trade, by associating with those that know how. By becoming a member of his local organization he will speedily gather information that can be obtained in no other way. Whatever his difficulty or whatever the subject, there he will find a bunch of experts ready and willing to help solve his problems. They have been through the mill, and are still going like himself.

Presuming that he is now a full fledged member what should he aim to do and be? First he should train himself to consider the Society meetings a very vital part of his business. If the time is called for five he should be there on time. He should remember that he now has as many shops as there are members to call on in case of need where he had but one before, and the same number to possibly take what he would like to get rid of. Continual intercourse will show him that, while he will only touch his fellow members on one side of their characters, he will find them very white and very loyal at bottom. It will take time to discover this, and moreover evidence of it will crop up in the most unexpected places. Financially there never is any trouble if the organization is what it should be. If there is, then there are too many members, and safety does not always lay in numbers.

In addition to what associations can do and are doing for individual members, there are certain of their activities that benefit the entire trade and the general public as well, from watching proposed municipal by-laws, boards of health, water boards, provincial and federal legislatures; furnishing information on

their particular subjects to M. Ps., contributes, or the more humble alderman who expounds some subtle idea with that fine frenzy we all know so well and which emanates from the same source as that which keeps your railroad rates, delivery charges, etc., not quite so high as those interested would like.

Governments depend on trade organizations to furnish the necessary information when it contemplates bringing forward new legislation. The last important work in this connection, was the workmen's Compensation Act. Trade organizations furnished the necessary information, and then it was carefully blended by a master mind. Canada perhaps has not taken up the matter of trade organizations as fully as other countries but unless all signs fail it will be increasingly necessary in the future.

The old idea of each working for himself, where excellence of skilled workmanship was alone considered the ideal, was perhaps more satisfactory than this, but the advent of machinery speedily changed all that. Those were the days when people provided their own amusements; to-day we have games played by professionals and those that really would benefit by the exercise simply look on, of course, after settling with the box office. While this is but an imitation of the real joy of playing the game, we are now accepting an imitation of an imitation in the presentation of moving pictures. The budding Sanitary Engineer however will find he has to deliver the real goods, and if it be true that the vital period of a man's business life is but ten years, it is very obvious he cannot waste much time experimenting in how to run a business and more especially a type of business that has changed in every sense so much in the last twenty-five years.

In these days pressure systems, flushometers, automatic water heaters and the very numerous and varied systems of heating, and things electric looming up and not so very far away, make it more and more imperative for the individual to seek co-operation. Truly, a man cannot live to himself alone.

And what of trade organization in the larger sense?

Will the Empire enter into closer trade relationship with its self governing parts? Will Canada continue to penalize the Mother Country by taxing her exports? Can the Empire continue to exist with co-operation unknown except in war? Will we continue to borrow money the interest on which goes to the common enemy? And what of those returning from the present trouble in Europe and how will the final costs be paid? There are still the problems of the Jap and Chinaman and Hindoo cheap labor, a menace or a blessing according to the manner in which they are handled. How is all this readjustment to be brought about? Are we going to continue to appoint blacksmith's and gun-manufacturers on boards of health? The Sanitary Engineer is pointing out what happens when those that know nothing of the business draft sanitary codes. Britain will probably cease to appoint ambassadors and their first, second and third secretaries, and also consuls, who cannot speak the language of the countries to whom they are accredited, or any other language but their own, when her merchant and export associations take a hand in the game.

These are the associations that will see to it that an international society will continue the work of Professor Flinders Petrie and others, showing how often Europe has been overrun by the peoples of Northern Prussia and when the recurring cycle may be expected that proper means may be taken to cope with the problem.

It seems to me these are vital matters that are now ripe for consideration. "Be prepared" is a good motto and he that gives the best he has to this work is as patriotic and as essential to his country, as those that are giving their best at the front to-day.

Price Cutting and Salesmanship

Price-Cutting Has No Part in True Salesmanship—Beating Down Prices Contrary to Principles of Good Buying—An Evil Which Causes General Demoralization—Scientific Salesmanship the Remedy

By "One of Us."

A FEW days ago I was making a call on a member of the craft, and found him in conversation with a salesman employed by one of our well-known firms of manufacturers of plumbers' brass goods. The salesman was putting forth every effort to sell a line of goods, but to no purpose. He used every available argument, emphasizing the practical certainty of a rise in price in the near future, but he could not induce the tradesman to give him an order. Finally, however, he made an offer to split his own commission with the merchant if the latter would place an order. This offer had the desired effect, and the order was given. Introduced as I was on the negotiations, I [illegible] my business towards my identity, but on the salesman's departure I introduced myself to the merchant and remarked that the salesman appeared to have worked hard to get the order.

"Yes," the plumber replied, "he's a good fellow in his way, but he's known to cut prices now and again, so I felt like making a few dollars on the deal."

Can any one imagine a more deplorable instance of the evils of price-cutting than this? It is difficult to say which of the two parties was the most to blame; the salesman who, for the sake of booking an order, would thus depreciate the value of the goods he was selling, thereby damaging the reputation of his firm, or the tradesman who, for the sake of a dollar or two, would so demean himself as to take advantage of the traveller's misplaced anxiety to make a sale. Such a transaction could not fail to have a most demoralizing effect upon both parties. Its immorality verges on the criminal.

I afterwards asked my plumber friend how he would like to employ a man who, for the sake of getting an order, would offer to share his commission with one of his customers. To my astonishment he replied that price-cutting was the "snake-in-the-grass" of all business, not seeing that by his own action he was guilty of doing his best to keep the "snake" alive.

I would willingly think that the above instance was a rare exception to the general standard of business methods in vogue with the craft as a whole, but experience compels me to the conclusion that, although there are a large number of our members who would scorn such practices, there are still a not inconsiderable few who are so short-sighted that they cannot see that in following such a line of conduct they are their own worst enemies. These misguided individuals persuade themselves that they are compelled to adopt methods of this kind because others do it, and unless they follow suit, they imagine they

will be left behind in the race for success.

Until the members of the craft generally can bring themselves to carry on their business on a higher moral plane, it is useless to expect that the craft as a whole will earn the respect of the general public. If our business is to be conducted on these lines, what will be the result? Nothing less than demoralization all round. The customer will feel he has done a good stroke of business if he can beat the plumber down a few dollars and cents in his price. The plumber will feel bound to get even with the customer in some way, and the job will consequently suffer. The workman will think it smart to do the boss, and the boss in turn thinks he is doing good business in getting the man to work for a few cents an hour less than his proper wage. The jobber is up against price competition; he is not interested in quality unless the price is low. The manufacturer must meet the jobber's price or the order goes to a lower bidder; and so it goes on all round the circle. And the root of the whole evil is price-cutting.

Now what is the remedy?

First and foremost, a better general knowledge of the science of salesmanship. We must have manufacturers who can sell; jobbers who can sell; sanitary engineers who can sell. And the first requisite of salesmanship is to have confidence in your goods or whatever it may be you have to sell. The manufacturer's watchword must be quality. He must have confidence in his goods himself, and must be able to instil that confidence in the jobber also, so that the latter can communicate that same confidence to the sanitary engineer who buys the goods. The sanitary engineer must not only have confidence in the goods he supplies to his customers, he must also have confidence in the high standard of the work he supplies and of the services he renders. And last, but not least, the workman must have confidence in the quality of the work he puts into a job. And such must be the confidence that all these men have in the high quality of the commodity they sell, be it work, service, or goods, that any attempt to beat down prices would not for one moment be entertained. Let it here be said that good buying is also as necessary for the successful conduct of business as good selling. But even as price-cutting has no part in good salesmanship, so has beating down prices no place in the methods of the good buyer.

Again, both good buying and good selling hinge upon one thing—that is the scientific management of one's business. A manufacturer engages in producing a certain line of goods. He must calculate the cost of the raw material and labor. He must know what his overhead expenses are. He must allow for interest on capital and all other business expenses, and then must fix his price accordingly to allow for all these and a fair profit in addition. And he must remember that the cost of production and of selling is not ended until the cash is in his till for the goods produced and sold. Many a good business has come to grief because selling price has been based on cost of production only up to the manufacturer's stock room.

The manufacturer having fixed his price, it is the salesman's duty to sell at that price, which must be maintained, otherwise cost of production is increased, not decreased. The salesman who lends a too ready ear to every cock-and-bull price-cutting story is actually cutting the ground from under his own feet.

Take the incident mentioned above. How could that salesman ever expect to sell the same line again at its proper price to the man for whom he had once cut his price? Would not the plumber naturally make any subsequent order conditional on the price being the same as he had already paid, to say nothing of the probability of the salesman having to supply other customers who might hear of the cut price at the same rate?

Here is another qualification necessary to the good salesman. He must be able to show his customer how to sell the goods with which he is supplying him. He must in a way be able to create a demand for the goods he has to sell by showing how they can be sold to the customer.

I was in conversation with a manufacturer a few days ago and he informed me that one of his salesmen had been complaining to him of the tendency among plumbers generally to try to cut down the price of goods. He had suggested that, in order that the manufacturer might be able to reduce the price of some of his lines, he should reduce the amount of his advertising. This would be very much like putting back the hands of the clock in order to save time, or like sawing off the branch of the tree on which one is sitting. If business is dull with the trade generally the salesman has it in his own hands to point out the way to secure fresh business. Let him read the articles which a short time back appeared in The Sanitary Engineer showing how business in the country is to be had for the going after it, and let him impress this upon his customers. The sanitary engineer in the past has not made it a practice to go after business; let the salesman impress upon him the necessity of doing so now, and his order book will soon tell a different tale. Let him not, however, as he values his existence, start the suicidal policy of price-cutting.

Finally, let us one and all, manufacturer, salesman, sanitary engineer and workman, resolutely set our faces against this evil which is threatening us. Let us have confidence in our goods and in our work. Let our watchword be: "Good value in goods or service for fair pay," and we shall thus place our business on a higher plane and gain the respect of all those with whom we come in contact; and the man who either offers a cut price or asks one will be judged as not knowing his business, and will be left severely alone.

MILITARY EXPERTS AND PLUMBING IN ENGLAND

The following item is taken from the March 4th issue of "The Ironmonger," an English paper published in the interest of the hardware trade:

> W. Wilkinson, ironmonger and plumber, of Grasmere, applied at Ambleside for exemption of his plumber, A. E. Carradus, as he had failed by advertising to get a substitute. The military representative objected that plumbing was not work of national importance. The claim was disallowed.

No doubt our military experts are doing a good work in bringing men who should be at the firing line, up to time. Every man with a grain of conscience should only be too eager to serve his country and fight for freedom. But the decision that plumbing is not work of national importance, proves that this particular expert errs somewhat.

In peace or war plumbing is very essential, and if plumbing in England is neglected to such an extent as to allow homes, factory buildings, and offices to become insanitary, it will result in bringing to life a far greater enemy which may bring plague, disease and death to all around.

Plumbing is a work of not only national but universal importance.

In the same issue of "The Ironmonger," an employer pleads exemption, for a plumber's apprentice, pleading that the apprentice has only served two years of his time and that he will be no use to his trade as a plumber when he returns from the war.

Such a plea is ridiculous to the extreme. If such were actually the case Canada would be in a bad way. Several thousands of men in the same class have left for service overseas. The Sanitary Engineer is pleased to be able to look round and note the number of plumbers and fitters who have joined the fighting forces.

Never a day passes that we do not receive reports of some of the boys working at the trade joining the ranks to do their bit, and we're proud of them.

READ THIS LETTER TO THE EDITOR—

I AM wondering how many of your readers saw the article on the Farm page in the "Toronto Globe" of Wednesday, March 15th last, under the caption of "City Conveniences in Country Homes," and I am also wondering how long the good work done by your paper, trade organizations, municipal governments and other organized bodies, is to be hindered and frequently nullified by such articles as that to which I refer.

This article is signed by "Ahmik" (presumably an Indian), and if the character of his writing is to be taken as an index of his stock of information concerning present day conditions and requirements, then his wigwam must be very far back in the woods indeed.

In the first paragraph of the article, we find the statement that "inside lavatory accommodation" is found "here and there all over the Province," and that "in at least one home, a windmill is utilized to pump the water."

What a truly wonderful advance the owner of this windmill has made! He must be the envy of all who have seen it. I had thought that there were some hundreds of thousands of windmills used in this country for the purpose of pumping water, and it seems to me that the sight of these mills will be a fairly familiar one to most of your readers.

The article goes on to relate that in another home "a wholly novel idea exists," and proceeds to describe an installation, which is merely an old-fashioned elevated tank in a barn raised sufficiently high to allow the water to flow by gravity to the house. It will undoubtedly be gratifying to your readers to learn that the law of gravity can be utilized in this way!

The article then goes on to refer to case after case where cisterns are in use and the water is pumped by hand to "a wooden tank lined with galvanized iron, located in the attic," and then proceeds to say "the cost of water service such as farm homes now have, varies with circumstances. **A man who is handy with tools can do all the plumbing himself,** and the only cash outlay, aside from the cistern and tank, is for piping, bath tub, etc., in which case the money cost is almost ridiculously small,"—"with inside lavatory conveniences, a serious source of discomfort and danger to health, particularly in the winter, is wholly removed"—"all waste water from bath and wash room goes to the sewer pipe, which has a trap and breather just outside the house. From the house there is a fall of some 15 ft. in 50 ft. to an open ditch. The sewage goes through glazed tile with cement joints to a cement cess box, 4 ft. by 4 ft. by 4 ft., placed about 30 ft. from the house. This box is covered with plank with 3 ft. of earth over the plank. The liquid overflow from the cess box goes to the open sewer." (A condition specificially forbidden by law,) and concludes, "There are comparatively few country homes in Ontario where the realization of this ideal is beyond reach."

Apparently, therefore, the "ideal conditions," in the Globe's opinion, under which a farmer and his family should live, are very different from those for which the urban municipalities are constantly striving, and all up-to-date governments, whether municipal or otherwise, are legislating.

Why, for example, do we find plumbers licensed in the biggest and best governed cities? For the obvious reason that the danger to health from defective plumbing is great, and that even where skilled mechanics do the work, thorough inspection is required. What can a farmer expect, therefore, if he, with no technical knowledge, follows the advice of the Globe and attempts to install his own plumbing? How is it to be put in, in a sanitary way? How is the health of his family to be safeguarded? But how can he be blamed for the attempt when papers like the Toronto Globe, which are supposed to help to mold public opinion in the right direction, and to furnish up-to-date and reliable information, deliberately recommend a course absolutely at variance with the experience of everyone who knows anything at all about the subject?

"Ahmik" will, perhaps, say there are thousands of farm homes in this country where no conveniences at all are provided and that what he recommends would be better than none. The first statement would undoubtedly be true, but the second would not, for the very clear reason that if defective sanitary arrangements are to exist at all, they had much better be kept outside the house than inside, where every breath that the occupants draw will surely be tainted.

Is it not time that some concerted action should be taken by those best able to judge in such matters, with a view to having the Governments of this country take such action as will prevent the very condition of affairs which the article referred to recommends?

Great public benefits have almost invariably been brought about by agitation, and in the matter of the installation of the sanitary arrangements of private homes outside the large municipalities, it seems to be that a strong agitation is just about due.

Very truly yours,
J. M. QUINN,
National Equipment Co., Ltd., Toronto.

—AND THEN READ THESE EXTRACTS FROM TORONTO GLOBE

THE following are extracts taken from an article which appeared in the March 15 issue of **The Toronto Globe**, which is referred to in Mr. Quinn's letter on the preceding page. The writer, Ahmik, is apparently posing as "Some Authority" on sanitary equipment. The article opens with the following ludicrous statement:

"Ten or twelve years ago water under pressure and inside lavatory conveniencies were almost unknown in farm homes. To-day these time-saving and comfort-promoting adjuncts **are to be found here and there** all over the Province. In some cases electrical energy furishes the power necessary to provide the pressure; in some gasoline engines are made use of; **in at least one home**, that of E. C. Drury, **a windmill is utilized**; in the majority of homes dependence is placed on a hand pump, which forces the water **into a tank in the attic**, the **pressure** from the tank above causing the water to flow freely from taps in the lower parts of the house."

Just imagine "Ten or twelve years ago water under pressure and inside lavatory conveniences were almost unknown in farm homes."

Ahmik must certainly be some Mik from the land of Nod, or has lived in the woods all his life and sudden entrance into civilization has resulted in a temporary brainstorm. There are farm homes in Canada not simply "here and there," but all over the Dominion, which have used the old attic tank and inside conveniences for the past 25 years or more.

But just read again another extract from this marvellous chronicle of progress.

GRAVITATION IN THIS CASE

"In the home in which the late J. W. St. John once lived, near Sunderland, **a wholly novel idea** was put into effect. The barn on the place stands on a little higher ground than the house, but an elevation between the two buildings prevents water flowing from the barnyard to the house. Still the elevation of the barn is such that a tank placed on the main floor, above the basement stable, when full of water, forces a flow towards the house sufficient to give a really good pressure in the house itself. The tank is of boards lined with galvanized metal, and as it takes all the rain water which falls upon the roof there is always a sufficient supply, not only for household use, but even for washing the buggy and watering the flower beds by means of a hose."

The wonder is that Sir Isaac Newton has rested in his grave so long thus allowing the millions of people to exist until this day without knowing something about the law of gravitation. I really do not see anything very novel about the system referred to above and will therefore quote the next spasm by Ahmik:

"Among the first to install a water service in a farm home was Elmer Lick of Ontario county. When Mr. Lick built his new residence of concrete blocks he put in a cement cistern 5 feet wide, 6 feet long and 8 feet deep. This takes the water from a slate roof, **and the water so collected is so clean it has not been necessary to clear out the cistern once in the seven years it has been in use.** At first Mr. Lick depended on a hand pump to force the water into a tank in the attic. "That was the meanest job I had to do about the place," he said. He has a better plan now. He has tapped the electric wire passing his door, and the energy so received not only pumps his water, but lights his house and barn, and all for an average cost of around a dollar a month. "The light in the barn," said Mr. Lick, "is the greatest convenience we have on the farm."

"On the farm of J. W. Clark, in Brant county, hand power is used in pumping. Mr. Clark has a cistern 8 x 11 feet, in which the water is collected, and he uses a hand pump to elevate the water to a tank in the attic. 'Fifteen minutes' pumping,' Mr. Clark says, 'will supply enough water for the bath and other purposes to last two days.'

A TYPICAL WATER SERVICE

"An excellent illustration of what can be accomplished in the way of furnishing an inside water service in a country home is afforded by the experience of John Baker, of Darlington township. Mr. Baker had the advantage of beginning life with a new house, and his water service (he has both hard and soft water **under pressure**), was installed when the house was built. The plumbing and installation of the service were let by contract and, outside of the supply of water and disposal of sewage, cost $200. The whole water system, hard and soft, is operated from a small wash-room at the back of the kitchen.

It is certainly a most wonderful cistern which can be in constant use for 7 years without cleaning out. But let us further see what Ahmik has to say about Mr. Lick's equipment:

"A small iron pump stands at one end of an enamelled sink, 3 feet by 1½ feet, and the pump draws the hard water from a well twenty feet deep, located about twenty-five feet from the house. There is also a small three-cylinder force pump, which draws the soft water from a cement cistern directly below in the cellar. The soft water is forced up into a wooden tank, **lined with galvanized** metal, 6 feet by 2½ feet by 2¼ feet, located in the attic. The soft water service is connected with a hot water front in the kitchen stove, and supplies the bathroom and kitchen sink with hot and cold water. It is also used in flushing the closet. Both the tank in the attic and the cistern in the cellar are provided with overflow pipes.

"All the waste from bath and wash room goes to the sewer pipe, which has a trap and breather just outside the house. From the house there is a fall of some 15 feet in 50 feet to an open ditch. **The sewage goes through glazed tile with cemented joints to a cement box 4 feet by 4 feet by 4 feet, and placed about thirty feet from the house. This box is covered with plank, with three feet of earth over the plank. The liquid overflow from the cess box goes to the open ditch, but it is only when the washing water goes down that any overflow is noticed at the ditch.**

"'This system has," says Mr. Baker, been in operation over four years and the cess box has never been opened. We have had continuous service and everything has given perfect satisfaction.'"

This reference to the "cess box" and method of sewage disposal is bad. It is against the law to allow the overflow from a 'cess box" to run into an open creek. This makes the creek actually an open sewer.

What is our conservation commission doing to allow such conditions to prevail? Where is the mischief going to end?

If such an article had appeared in some cheap penny-a-liner, we would have thought very little about it, but for a paper like the Toronto Globe to publish such preposterous and palpable piffle under the guise of progressiveness is, to put it mildly, painful.

The following is still a further effusion from the pen of Ahmik:

COST A MERE NOTHING.

"The cost of water services such as many farm homes now have varies with circumstances. **A man who is handy with tools can do all the plumbing himself, and the only cash outlay aside from the cistern and tank is for piping, bath tub, etc. In such cases the money cost is almost ridiculously small.** Even where hired help is required, all the way through, the cost is less than is usually incurred in furnishing a parlor that is hardly ever used save for a wedding or a funeral. On the other hand the value of the benefits secured is almost incalcuable. With cold and hot water under pressure in the kitchen, the most disagreeable and toilsome part of the housework is no longer drudgery. With inside lavatory conveniences, a serious source of discomfort and danger to health, particularly in winter, is wholly removed. Where gas engine or electric power is used, in addition to giving power for the water service, to turn the washing machine and drive the separator **the term "housework" becomes a misnomer; then housekeeping is really play.** The nearest approach to an ideal life is that wherin the conveniences of a city are supplied to a home located in the shade of an orchard and with the glories of the open country spread out on every hand. There are comparatively few country homes in older Ontario where the realization of this ideal is beyond reach

AHMIK."

Just imagine, readers, that after all these years of study and hard work, after all the science involved in constructing a truly sanitary installation in a home, the Toronto Globe allows it to be said that "a man who is handy with tools can do all the plumbing himself."

What are our boards of health for? Why do men serve their 5 years' apprenticeship to learn a trade if a handy man CAN do plumbing work, etc.?

What are boards of examiners for in connection with the licensing of plumbers?

No man on God's green earth is doing so much to maintain the health of humanity as is the sanitary engineer, and the least a paper of the Globe's standing can do is to avoid the publication of such blatant balderdash, which is rendered more dangerous by the very fact of its endorsation by such a paper.

We should be glad to hear the opinions of others of our readers on the above quoted article. It is only by constantly hammering at it, that the tide of danger caused by such misleading articles can be stemmed.

EDITOR.

Men and Methods

Plans and Methods Which Are Helping Men and Apprentices to Advance From the Ranks—The Head of the Largest Trade Association in the United States Explains the Fundamental Principles on Which it Was Built

Reprinted from System, the Magazine of Business.

TO-DAY the United States is probably at last awake not only to the possibilities of wider markets, but to the actual need of them in obtaining a rational growth. Naturally, therefore, we turn to the European nations which have been successful in world-wide markets to see what methods they have used.

Going back to the beginnings of a number of the influential maritime and commercial nations, such as England, France, the Netherlands and Germany, we notice the prominence of the trade guild, or organizations binding together the dealers in the various lines. The Hanseatic League of Germany and the East India Company of England were modifications of these great trade guilds, the buildings of which in Lubeck, Antwerp, Bergen and London still stand as monuments to commercial effectiveness.

The United States has had a few organizations similar to these European guilds, but still fewer have survived. Perhaps the one which can claim the greatest longevity and influence is the National Master Plumbers' Association with its twelve thousand members. Its success can easily be ascribed to its dominant two-fold policy: Service to its membership and service to the public. Adherence to this same policy—with such modifications as the times made necessary—was characteristic of the European trade guilds.

No small part of the association's success is due to another policy, however. This provides that its vice-presidents be most carefully selected, and that each carefully selected vice-president be promoted to the presidency for one year. After they have served one year, the ex-presidents become an unofficial [illegible]

This policy indicates what a large part its officials play in the association's success and naturally arouses our interest in James S. Cassedy, for he is its president now. He is a living example of the association's policy of advancing the right men, once they are found. He began as a plumber's apprentice, soon [illegible] the ranks of the journeymen, and then became a full-fledged [illegible] And to-day [illegible] combination [illegible] hundred [illegible] men in his line of business.

What Mr. Cassedy thinks about the [illegible] will do the most to make a commercial organization succeed are therefore worth considering. "In view of the fact that the National Association of Master Plumbers is from several points of view perhaps the largest and most effective trade association in existence," he says, "it is not surprising that its officers should be continually in receipt of questions about the principles on which it is founded and the system on which it is administered.

Why These Plans are of Interest to Most Associations and Their Members

"While our organization has a membership of well over ten thousand master

JAMES S. CASSEDY
President of the National Master Plumbers' Association

plumbers, whose line of business is of a highly specialized nature, still there are certain principles on which this association is conducted that are just as applicable to anybody striving for the same end—namely, standardization of material and working conditions—the accomplishment of which will result in good to the public at large and its membership.

"A generation ago, a small group of master plumbers, all of them in prosperous circumstances, met with the idea of organizing a body which would gather into its membership all masters who had the desire for better material, better installation of fixtures and better working conditions generally. This could not be accomplished by individuals. It had to be effected by the group—the many working in various localities and viewing from various angles the questions which would and did, come up.

"These men realized that such an organization could only be formed if it held out a promise of increasing the revenues of its members—the pocketbook appeal is the most effective to the average man. They also understand that, on the other hand, the organization could not be maintained—kept alive and growing—unless it stood for the good of a greater number than its membership could ever expect to reach individually—in short, the public. The wisdom of the founders of our association has been made apparent in many points, as the years have gone by—but in none to a greater extent than in this policy—for the good of the public. Without this policy as a basic principle no trade organization can survive.

"But another basic principle was: for the profit of its members. This seemed at first antagonistic to the other. To reconcile the interests of its membership, to increase their profits, and to justify the association in the eyes of the public—that has been the endeavor of each succeeding board of officials ever since the association started.

"Entering into price combinations was entirely out of the question—that would have been a violation of good sense, if there had been no statutes to the contrary. It became a matter, then, of increasing each member's value as a business man—of speeding him up. And this could only be done by education and inspiration. That has been our policy and promises to remain so. To speed up, to systematize, to conserve both labor and material, that is our aim as an association.

"That we have done this I shall demonstrate a little later by a few figures and facts—but how?

"The master plumber is a product of trade evolution; he begins as an apprentice, works into the stage of journeyman, and from that, if he has the ambition, passes into the ranks of master plumbers. He arrives at the last stage with a thorough knowledge of the mechanical requirements of his business but in many instances with but the crudest conception of buying and selling and of the vast detail which enters into

the life of one who has both labor and material to sell.

"Our starting point, then, is the apprentice. I know the apprentice system is not popular with the American youth—it takes the long road. It is the long road, but is, after all, the sure road, the real success for the master plumber. I am fully convinced that the adoption of and strict adherence to the apprenticeship system in other lines of business would solve many of the troubles which now afflict these trades. We Americans need to cultivate the spirit of thoroughness.

"As an association we have no direct control of the apprentice or of the journeyman; that is left to our subsidiary bodies, the state and local organizations. And the rules vary somewhat, though we attempt to standardize as much as the far-scattered membership will permit. But when the journeyman enters the ranks of our national association as a master plumber he becomes a subject for us to work on.

"We depend on the meetings of the local and state associations to inspire him with a realization of the value of teaming with his competitors; of benefiting from hearing their viewpoints on debatable questions and of observing how they do business. There he gets the inspiration which comes from the group; from being one of over ten thousand; from seeing men looked up to by their fellows—men who once were struggling beginners as he was. There he grasps the need of, at times, making sacrifices that the future may be brighter. And there he learns—and this is most vital—that the public has rights and a most emphatic way of asserting them.

"In advertising, too, we are reaching out with our educational efforts. Some locals have had lectures and discussions along that line, and have taken up the effective distinction of circulars to patrons, selling letters, and even collective advertising. By collective advertising is meant a newspaper or periodical advertisement, placed by the local association as a unit, covering some seasonal suggestion. In October, for example, one of these advertisements might call the public's attention to the advisability of having the plumbing equipment of residences and other buildings looked over before the cold weather sets in. It would be signed, not by any individual, but: "The Master Plumbers' Association."

What Usually Results from a Trade Association's Successful Work

"This very effective plan could be applied to certain lines of fixtures which are handled by the trade generally. It does more than merely bring business; it reflects credit on the association as a whole.

"I might continue enumerating methods by which we educate ourselves in the association, but I have already indicated how each member is made of more value to himself and to his fellows. He discovers trade economies; he plans to keep down his overhead; to increase his sales, not by taking a job away from his competitor by tricky means, but by reaching out for new sales fields. He becomes, in short, an efficient merchant who understands thoroughly both ends of his trade.

"And doing all that results, of course in a measure of prosperity to him himself— and just as naturally, also in enabling the public to get more goods for its money.

"To illustrate the possibilities of associations along the line of public endeavor, I want to refer to the differences between 1916 and 1895 in respect to what the public has gained, partly through the collective idea among master plumbers.

"In 1890 the ordinary bathroom contained a copper wood-encased tub, a lavatory put together with plaster of paris, and an unsanitary closet. The entire combination, filthy, unsanitary and inartistic, cost no less than fifty per cent. more than is paid for the same number of fixtures by the public in 1916.

"To-day the tub has a roll rim, and is made of iron and lined with an enamel coating that has no end to its life; the lavatory is either iron enameled or porcelain and is made of but one piece, the closet is absolutely sanitary. The fixtures as a whole are artistic in design and will last as long as the structure in which they are placed. Yet they cost less.

"In 1890 a sanitary code in any communities except the very largest cities was unheard of. Any ambitious individual could become a master- plumber over night. To-day the smallest towns equipped with water supply have sanitary codes. The humblest job is inspected by a disinterested official employed by the municipality. Now it is absolutely necessary for a journeyman to take a public examination and to be licensed. The masters, too, must be licensed.

An Illustration of How a Trade Association Can Help the Public

"The association has been the prime mover in the study and discussion of such vital questions as the dangers resulting from bacteria, typhoid epidemics, contaminated water supplies, poor house conditions growing from causes in addition to poor plumbing, and so on.

"The decrease in the mortality from typhoid and other filth diseases is conceded by all to be in part due to our activity as an association in keeping the danger before the public. The master plumber has become the preventer of many diseases and our work as an association has helped inspire several of our leading institutions of learning—such as Harvard University—to start courses in sanitary science.

"The public comfort-station movement, now spreading so rapidly, started with our association, and we worked hard for it. The last meeting of the Massachusetts legislature passed a law making the establishment of such public necessities obligatory in cities of ten thousand and over in Massachusetts.

"If we are, as a nation, to take our place in the sun, we need to be thorough in our mechanical lines—the trade association can bring that about through the apprenticeship system. And we need better means for mercantile education—that also can be accomplished through such organizations. That the National Association of Master Plumbers has been compared to an European trade guild simply goes to show why some of the European nations have been able to develop over-seas trade to the exclusion of some of our manufacturers and merchants.

"The association's educational work I look upon as the most important part of our activities. The national association keeps this work before its members continually by printing the reports of the various committees appointed at the annual conventions and by outlining courses of study and lectures to the local associations. We have several lecturers in the field who discuss overhead. We encourage discussions on that subject in the state press as well as at both the state and national conventions.

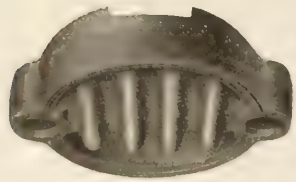
"Instruction in salesmanship is also being taken up through the same channels. Not only do we seek to develop the master plumber's latent ability to sell, but we strive to bring out the sales possibilities of all his employees: his typist, his bookeeper, his journeyman, and even his apprentices. Making every employee a part of a live sales force is a slogan with us.

"Then the national association campaigns for better looking showrooms and show windows, too. The public has lost what interest it ever had in the old lead trap which has for so long been the master plumber's standby in his window display. His store is no longer used as a stockroom, but for display purposes.

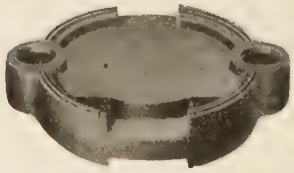
"Our basic object, in short, is to enable each member to enlarge his business until he can afford to do business on lower expenses. This will enable him to popularize plumbing fixtures and make more money, all at the same time."

DANIEL LOUIS HANSON

Burnham Boilers



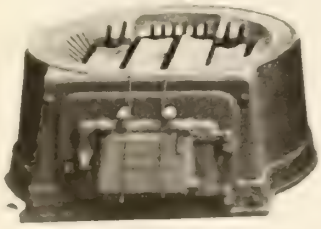
The crown sheet section has deep channels that more than doubles the direct surface.



The intermediate sections are reversible. They carry thin volumes of water, resulting in rapid heating and quick circulation.

The Dome or top section of the water boiler. The steam boiler has a good, generous-sized one with ample steam expanding space.

The fire-pot section is separate from the crown sheet.



Base section with triangular revolving grates.

It's the Long Fire Travel That Makes Their Short Coal Bill

IN both the round and square sectional Burnhams there is a long back and forth *horizontal* fire travel.

It's a sure cure for chimney scoots. The heat goes into the radiators and not up the chimney.

The crown sheet has deep heat grabbing teeth that doubles its direct surface.

The fire-pots are deep.

The sections are nipple connected.

Made for either steam or water in over 80 sizes.

Send for catalog and special dealer proposition.

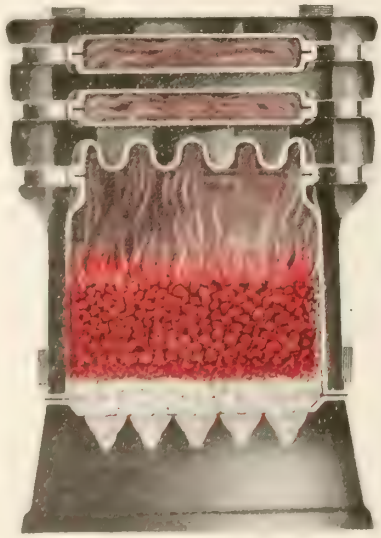
Goods sold to recognized Heating and Plumbing Trade only. No goods sold retail.

LORD & BURNHAM COMPANY, Limited

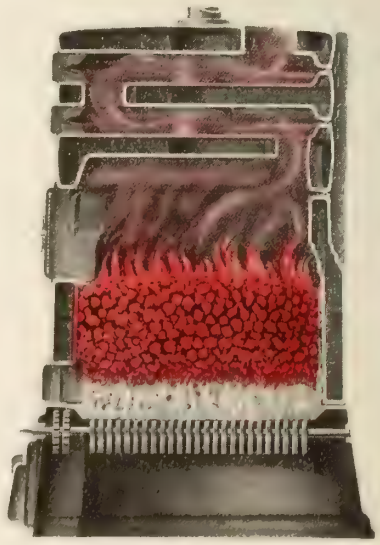
OF CANADA

(BOILER DEPARTMENT)

Royal Bank Bldg., TORONTO **Factory, ST. CATHARINES, ONT.**

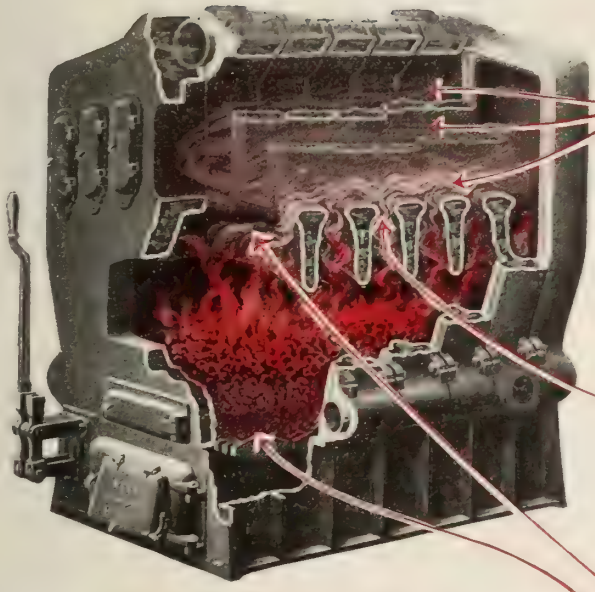


This particularly shows the deep channeled crown sheet. Note the triangular grates.



And this the back and forth **horizontal** fire travel. Observe the unusual depth to the fire-pot.

Burnham Boilers



Three times back and forth it travels

Side flue openings between each section

Cross fire channels between each section

Ridge-Shaped double trussed Grate

PARTICULARLY note that the fire is drawn up *between each* section, making each section *equally efficient.*

Each flue has its own separate clean-out door.

The grates shake half at a time, making shaking half again as easy.

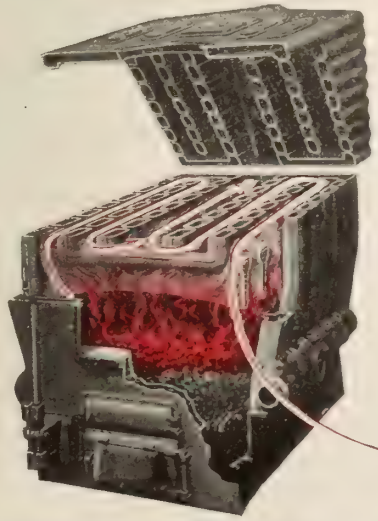
Sections are joined together by *short* tie bolts.

Sections can be added or replaced without loosening up entire boiler.

Goods sold to recognized heating and plumbing trade only. No goods sold retail.

LORD & BURNHAM COMPANY, Limited
OF CANADA
(BOILER DEPARTMENT)

Royal Bank Bldg., TORONTO
Factory, ST. CATHARINES, ONT.



Note that fire travel is 3 times back and forth, on both sides of boiler

THE SANITARY ENGINEER

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APRIL 1, 1916

COMING CONVENTIONS

ANOTHER year has passed since the first announcement was made that the 20th Annual Convention of the Canadian Society of Domestic, Sanitary and Heating Engineers would hold their convention at St. John, N.B., and again we are privileged to announce still another. That of the 21st convention which will be held in London, Ontario, this year.

The various committees have already spent considerable time in planning for this event, the dates upon which this will take place is June 20, 21 and 22, and following the example set by the St. John local branch of the Society, the Ontario Society will also hold their 5th Annual Convention upon the same date.

These conventions are becoming more and more essential to those engaged in the sanitary and heating trades. They are periods when each and everyone interested in the welfare and progress of the calling say to each other, in spirit if not in words: "Come, let us reason together." Those who have held office during the past year will be asked to give an account of their stewardship, and from what can be learned, these men will not by any means be found wanting.

The ranks have been very much thinned down on account of many responding to their country's call. Many of those to whom we refer are now fighting the battles of Kaiserism.

We sincerely hope that a goodly number of the craft will make a strenuous effort to be present at these conventions, and in that way lend a hand in fighting those evils with which business men in all lines are confronted. Full particulars will be published at a later date by THE SANITARY ENGINEER.

NO TIME TO READ TRADE PAPER

It would be very interesting to know how many subscribers to THE SANITARY ENGINEER take time to read thoroughly every issue of this, their trade paper. Not only the reading matter, but also the advertisements.

A few weeks ago the writer took a trip down East, and upon asking several readers whether they read THE SANITARY ENGINEER through as it came along, was very agreeably pleased to find that in most cases these readers did take quite a little interest in both the advertisements and reading matter. There were, however, one or two who did not.

In almost every case with the former, they were of the progressive class.

One member of the trade said he watched the advertisements to see what new lines were being made and declared that he very seldom missed an advertisement. In one case last winter he said he had come across a new line, had taken it up and made several hundred dollars as a direct result, though in years previous he had not given the attention he should have done to his trade paper.

Another reader declared that he had planned a season's business campaign already, based upon the information he had gleaned from THE SANITARY ENGINEER, and he is, at this early date, already reaping results.

The man who does not read his trade paper, cannot possibly obtain the information which appears in it from the ordinary book, simply because all books to-day are more or less too highly technical, too full of technical phraseology and their contents require almost a college education.

Then again, a trade paper is *the* paper which is specially printed with a view to giving just such information in as condensed a form as possible as will enable its readers to digest those topics of present needs. The same with the advertisements; when a subscriber to THE SANITARY ENGINEER looks over the advertisements, he is practically looking through the whole of the stock which is at his disposal to build up his business. He can then arrive at a practical conclusion as to what he should buy and where he

should buy it. The advertiser is practically saying: "Here are our goods, just judge the merits of them, we stand behind these goods." These advertisers are not backward in offering good value and satisfaction or money returned, and without doubt there is far more satisfaction in buying advertised goods than non-advertised goods, simply because the advertiser, when advertising, must make certain statements, in black and white, and will be called upon to fulfil those printed statements; whereas, the man who has not publicly made any claims for his goods has nothing to live up to.

Therefore, it can plainly be seen that not only from a technical standpoint, but also from a buying and selling standpoint, every person engaged in the sanitary and heating trade should not only be a regular subscriber, but also an earnest reader of this, his trade paper, THE SANITARY ENGINEER.

PRICE MAINTENANCE

THE question of price maintenance has been discussed from almost every possible angle and to date no real solution seems to have been arrived at. A little more thought should, however, be given to the matter from still another point of view, that of the reason, if there really be one, or price maintenance.

Of course we do not by any means wish to infer that if prices for certain commodities are not maintained, the result is price-cutting. Such is not the case. The whole question is this: one person can carry on his business on a less overhead expense than another, and because of a large turnover, a smaller percentage of profit is required.

For instance, suppose two business men are turning over the same amount of goods of the same value, say in round figures $52,000 a year. One is a good manager, knows the exact cost of doing business, overhead. His capital and credit involved is never more than $5,200, which means that only 10 per cent. capital is in a sense all there is involved. The other man does not keep tab on his overhead, does not watch collections and his capital involved is 20 per cent., he will not be able to sell goods as cheaply as the first man, by a long shot, simply because of the way he conducts his business.

It is all a matter of honest business management and is well worthy of note.

A man has no right to be in business if he does not at least provide for overhead expenditure. With regard to profits, that is his own business. He can please himself about that, though it would be a very rare case if any man started in business for the mere fun of being in business.

From now on some mention will be made of overhead expense and general business management, and if any of our readers would like to be informed on any matter coming under this heading, we will be pleased to answer any queries we may receive.

DECEIVING THE PUBLIC

IF a technical or trade paper makes an incorrect statement, it is very soon called to account. Technical questions are not a matter of opinion, a thing is right or it is wrong. For instance, you can never make a tap or a die cut do work day in day out without either oiling or destroying the tap. Any statement made to the contrary could be instantly nailed down as false, as it would be contrary to the law of friction and of Nature.

A daily newspaper on the other hand, apart from its news columns, is to a large extent given over to the discussion of opinions on debatable subjects on which every individual is entitled to his own opinion. He may be right or he may be wrong, but no one can with any certainty decide this.

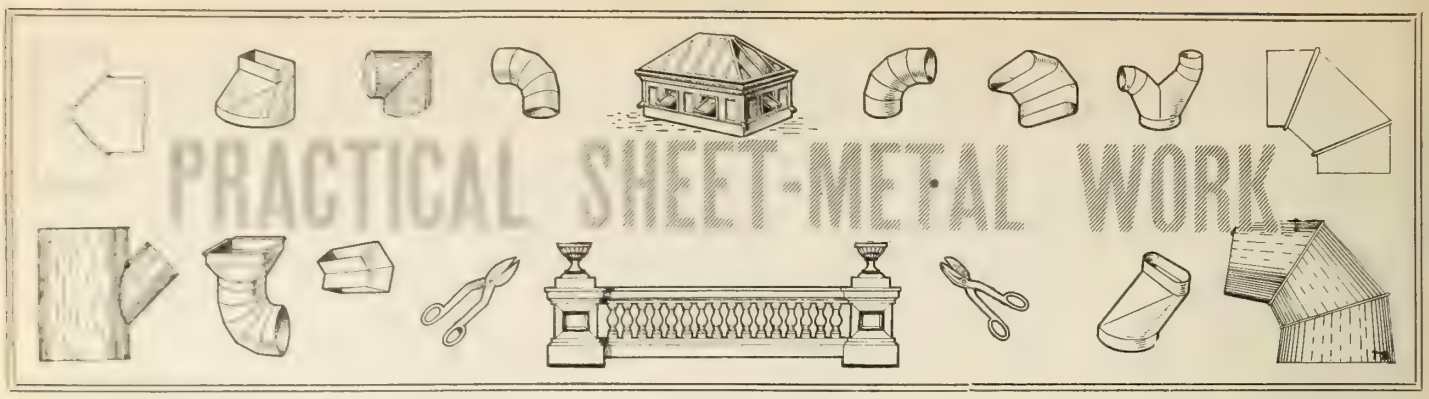
In discussing such questions, however, a daily paper owes a duty to its readers and that duty is to see to it that any information or supposed facts it may offer for the delectation of the public are in accord with truth and also that any advice it may give is such as is not palpably foolish, or such as, if followed, would land the advisee within the clutches of the law.

When a paper of the standing of the Toronto *Globe* utterly neglects the observance of these principles, when it foists upon an innocent public, under the guise of information and advice, a number of misleading statements, it is the duty of those who know that such statements are misleading to contradict them and thus as far as possible save the public from the evil effects which are liable to arise from the publication of such articles as that referred to on another page of this issue. We are under an obligation to Mr. Quinn, whose letter we also publish on this subject, for drawing our attention to the matter.

The *Globe*, as will be seen, advised its readers that a farmer or rural resident could, without difficulty, himself, fix up the plumbing for a sewage system by which the sewage would be discharged into a "cess box," the *Globe* apparently being of the opinion that such "cess-box" is a satisfactory sanitary contrivance. The proper title for this iniquitous arrangement is a "cess-pool," the meaning of which is a "cease-pool," a something where sewage is allowed to collect and "cease," to die, and putrefy.

Now any contraption which holds putrefied matter is bound sooner or later to pollute all and everything which comes its way, either water supply, or earth and yet the Toronto *Globe* is, as it were, holding up these "cess-boxes" as something of a sanitary nature. The farmer who has a "cess-box" or "cess-pool" on his farm is, as it were, living in close proximity ot a death trap, a volcano of disease, and he does not know it.

Worse still, the overflow from this "cess-box," we are told, empties into a creek, which in actual fact turns the creek into an open sewer, and the Toronto *Globe* tells its readers that this method is O.K.



By CHARLES SEIVERS

IN this issue is shown a pediment resting on sloping top of cornice. The mitre at peak being described in a previous plate, it is proposed to deal only with mitre resting on raking top of cornice. At elevation, A-B-C represents the pediment resting on sloping corner of cornice as shown by D-E. To draw pattern first, from a line as A-B in Fig. 1, erect an elevation of portion of one side of pediment as shown by B-C-D-E.

In this elevation draw or place a section of moulding as shown by section. Divide the curved mouldings into a number of equal parts and from each angle of the straight members and each division of the curved members draw lines parallel to C-B extending them to the line A-B.

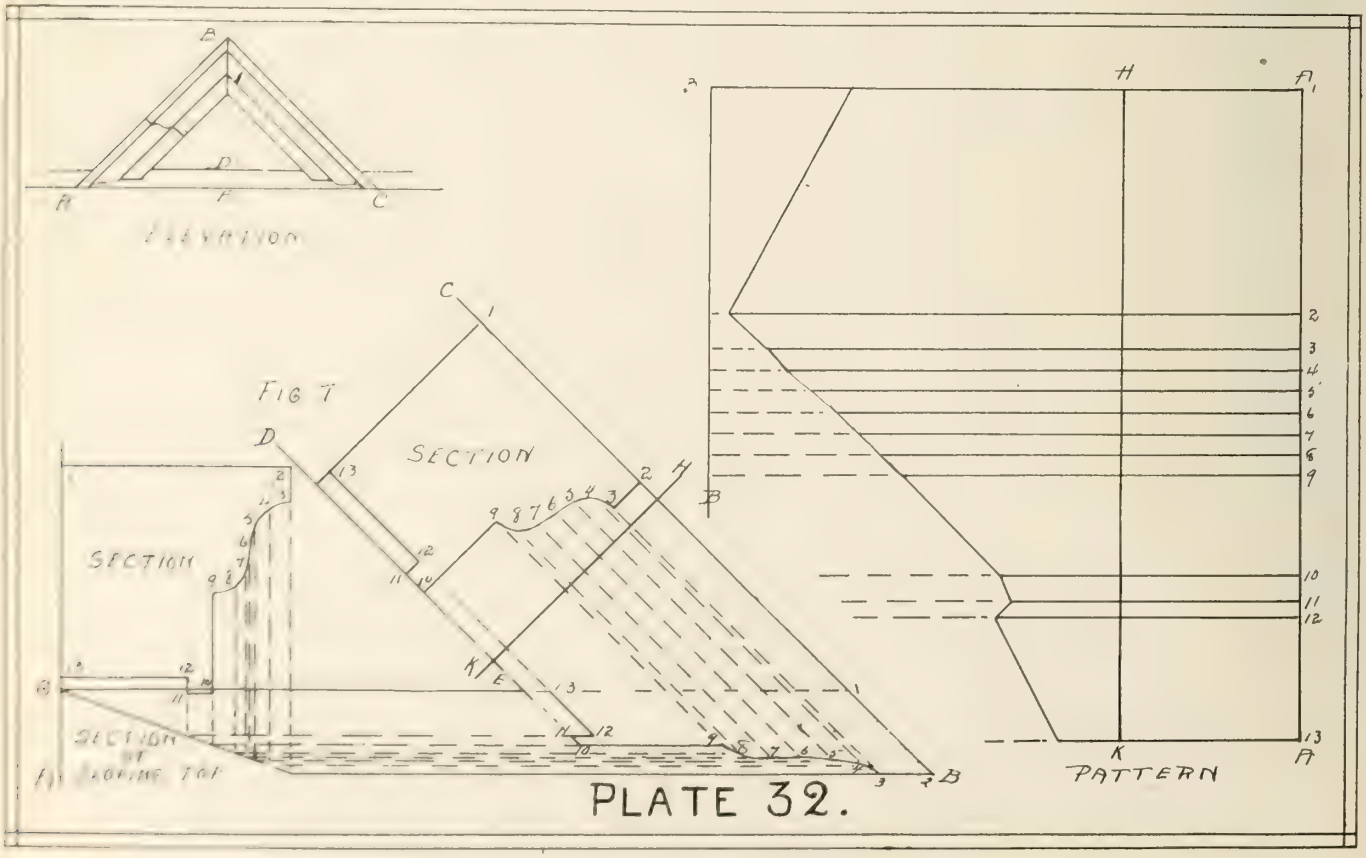
On A-B erect a section of the sloping top on which the pediment is to rest, as shown by A-F-G.

Immediately above the section A-F-G place a section of moulding as shown by section, and divide into parts as on the elevation, draw lines from each angle and division parallel to A-G until they intersect the line F-G. From where each line intersects the line F-G draw lines parallel to A-B until they intersect line drawn from their corresponding points in elevation, that is the line from point 1 on elevation intersected by line from point 1 on section of sloping top, point 2 by line from point 2, etc. A line drawn through the points thus obtained give true mitre line from which pattern is obtained.

The accompanying article is No. 32 of a course of practical problems for sheet metal workers prepared, especially for the readers of The Sanitary Engineer, by a practical mechanic who is constantly in touch with new problems which are arising in the sheet metal trades. These articles are a regular feature in The Sanitary Engineer, the only paper published in Canada in the interest of sanitary and heating engineering.

To lay off pattern draw two stretchout lines and on them lay off the different division on section as shown by 1-2-3-4, etc. Then draw lines joining 1 and 1, 2 and 2, 3 and 3, etc. As a line from which to obtain measurements on elevation draw the line H-K at right angles to B-C and on the stretchout a corresponding line, or one of the stretchout lines may be used to set off measurements from.

With compasses or dividers measure from line H-K, on the line now drawn from point 1, to the intersection of the line 1 and 1, and set off from line H-K on pattern, measure from H-K to intersection of lines 2-2, and set off on line two on pattern, proceed in the same manner with all the remaining lines, until all have been set off on the pattern, a line drawn through these points obtained will give outline of pattern required.



A Paper on Military Hygiene

A Paper Read by the President of The Canadian Institute of Sanitary Engineers at One of Their Recent Meetings, Showing the Great Strides Which Sanitary Science Has Made in Recent Years

IT is not my intention to cover the whole ground embraced in the term "Military Hygiene," but rather to direct your attention to the methods employed by military authorities on active service in keeping an army in a healthy fit condition and particularly those matters which we are naturally more interested in, i.e. the water supply and disposal of waste matter.

But I might premise for your general information a few facts and figures which will clearly show that the advancement of Sanitary Science in military affairs has been equally as great as in civil life if not greater.

In the last fifty years the military death rate in the United Kingdom has been reduced by 2-3rds and the number of men constantly inefficient from sickness by more than one-half and this condition obtains in the armies throughout Europe. The death rate of soldiers is now considerably less than that of men of similar age in civil life, though this was not always the case.

In India the death rate of British soldiers is now one-fifth of what it was 50 years ago and one-half of what it was 10 years ago.

While it is very desirable and necessary that the principles of Sanitary Science be applied in times of peace especially when the results I have just quoted can be obtained, it becomes even a more important consideration when on active service, as a sick soldier is not only a rifle lost in the firing line, but is an actual encumbrance, requiring special food, housing and transport, and the impediments that these entail do much to hamper an army.

Without going further back than the period of the South African war we find that in 31 months of that campaign the British force lost in deaths from wounds 6,965 non-commissioned officers and men and 13,590 from disease while 72,551 were invalided back to Britain. **For every man admitted to hospital on account of wounds 17 were admitted for disease.**

In civil life and in barracks at home stations, elaborate arrangements are provided to keep the soldiery in a healthy condition with good results but on active service large numbers of men are brought together without any of these elaborate arrangements for warding off disease, that have protected them in times of peace. Apparently, however, the improvised arrangements made for our troops in Flanders during the first winter campaign were very successful up to a certain point at least and show a decided improvement on the South African campaign. Mr. Asquith in dealing with this matter in the House of Commons stated that during the first winter in Flanders our troops only suffered from disease to the extent of 3 per cent., truly a wonderful accomplishment due to a great extent to inoculation against typhoid fever and the minute details governing the care of our troops in the field under the most trying conditions. In the Gallipoli campaign we have reason to believe this figure was greatly exceeded but no exact information is yet available.

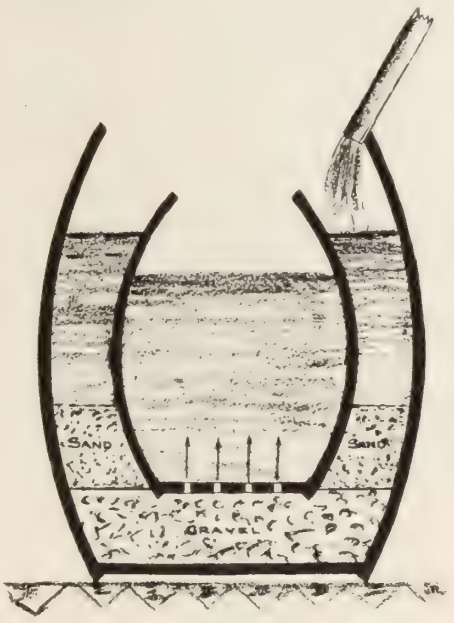


FIG. 1

This brief summary should suffice to show that the efficiency of an army in peace and war is very appreciably influenced by its health and that the improvements which have been effected in peace justify due attention being given to the subject so as still further to reduce disease during peace and by bringing about some similar reduction on active service to enhance the fighting efficiency of the military forces of the Empire.

Water Supply

The amount of water allowed in barracks is 20 gallons per day per man and the same per horse. In camps and bivouacs, however, these amounts are seldom available and would not be desirable on account of the difficulty in getting rid of the polluted water, 5 gallons per head and 10 gallons per horse are therefore considered sufficient.

The usual sources of supply are as in civil life from lakes, rivers, springs and wells and in considering the question of the selection and protection of water supplies and the purification of water a clear idea of the object in view is essential. This object is not to reject waters merely because they contain foreign matter or dirt, but to avoid or purify these which contain anything that will cause disease and by far the most important of the things which cause disease are bacteria. The impurities in water may roughly be classed under two heads, i.e., (1) In solution and (2) in suspension. The first class (in solution) and which usually consists of salts of lime, common salt, iron, etc., may be considered of little importance on active service as the impurities seldom exist in sufficient quantities to be injurious. But a good deal of attention must be concentrated on impurities in suspension and they consist of (1) dead matter such as dust, sand, vegetable or animal matter and (2) living organisms the most important of which are bacteria.

The book on Military Hygiene issued by the Imperial Government gives the following as the main points to be considered when arranging for a supply of water.

(1) Human contamination is the most dangerous.

(2) In the case of troops in camp or bivouac contamination is far more likely to come from the troops themselves than to be in the water originally.

(3) Disease germs do not survive long in water, hence it is recent sewage contamination that is most injurious.

(4) The greater the dilution of any contamination and the more distant the source the less the danger. For instance the drainage from one house flowing into a small stream or pond would make the water exceedingly dangerous, while the same amount of drainage going into a big river would have but an inappreciable effect on the water, a few miles down the stream.

The physical characteristics of water, i.e., sight, taste or smell are not reliable evidence of pure water as disease germs cannot be detected thus, therefore inspection of the water itself is of little value and analysis is impracticable with moving troops, but an intelligent inspec-

tion of the source of supply and its surroundings and of the mode of distribution and storage will generally show whether it is likely to be safe from human, that is sewage contamination.

Special precautions are taken to prevent contamination by the troops themselves. If in a river it is marked by different colored flags, i.e.,

White for drinking and cooking purposes.

Blue for watering places for animals.

Red for washing and bathing places.

If in a lake or pond or in a river used by troops further down its course it is only used for draining off drinking and cooking supplies. Water for washing and watering horses is conveyed in receptacles to selected places from which the drainage will not flow back to the source of supply.

Special care must be also taken that the drainage of latrines, urinals, washing places, trenches in which night soil or

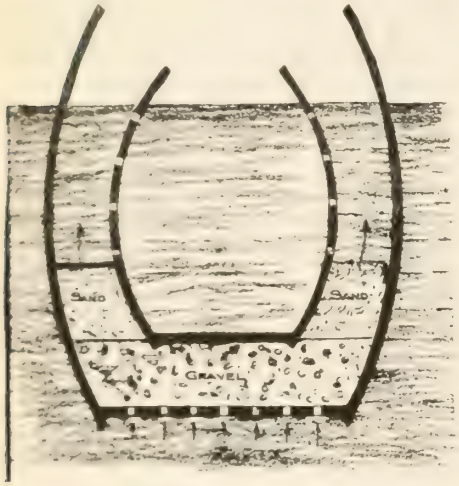


FIG. 2.

refuse is buried and of animal lines does not flow into the lake or river.

Purification of Water in the Field

The Field Service Regulations state that "as the health of a force depends largely on the purity of the water provided, everything possible must be done to ensure an ample supply of fine drinking water. Men must be prevented from drinking water that is not pure and must be trained to economize the contents of their water bottles. Water is best rendered safe for drinking purposes by boiling, or by the use of sterilizing filters which must be kept clean as otherwise they become dangerous."

The surest method of preventing water borne epidemics is to protect the water supply. In cases where a pure water supply cannot be obtained the following methods of purification are resorted to.

First, Sedimentation

By letting the water stand for a time most of the solid suspended matter is deposited. During the process a large proportion of the bacteria are also deposited, and many, especially the disease causing germs, die out.

Second, Precipitation

By adding certain chemicals of which the most useful is alum the rate at which suspended matter is deposited may be hastened. When added to water containing sufficient lime (as all except very soft waters do) it forms a cloud or precipitate which gradually falls to the bottom, carrying with it most of the suspended matter, including many of the bacteria. The amount required is about 5 grains to the gallon, or a heaped up teaspoonful to 100 gallons. In the case of very soft waters one part of lime or carbonate of soda should be added to each two parts of alum. The ingredients should be added slowly and well stirred.

Third, Classification

Muddy water can be clarified either with or without the addition of alum, by pouring it through a bag of flannel cotton cloth or canvas suspended on a wooden frame over a bucket.

Sand filters or strainers can be improvised on service by digging a pit at the side of a river and allowing the water to percolate through. If the bank is not sandy a trench may be dug and filled with sand or by barrels as illustrated.

Another way, if only a small quantity is required, is to use two barrels, one larger than the other (Fig.1). The smaller one has holes pierced in the bottom and rests on a bed of gravel inside the other barrel; the space between the two is filled for a foot or more with clean sand, and the water poured onto this. It will sink through the sand and gravel and pass up into the inner barrel. If the bottom of the outer barrel and upper part of the inner one are pierced, as shown in Fig. 2, the filter can then be put into the actual water supply. In this case the filteration is upwards.

The sand must be free from all contamination. To ensure this it should be roasted; neglect of this precaution has actually led to a widespread and very fatal epidemic of cholera.

None of the foregoing methods can, however, be relied upon to remove enough of the bacteria to render water that contains disease causing germs absolutely safe but must only be regarded as a means for clarifying muddy water.

Filtration

Porcelain filters are now used extensively on active service with good results. (See Fig. 3). The service pattern filter is made in 3 forms, one adapted to a water cart, a smaller one for pack transport and a still smaller one for coolie transport. All are constructed on the same principle. The water is drawn from the source by means of a hose pipe and pumped into the filter under 20 lbs. pressure.

There are various other methods of sterilizing water, notably by heat and chemicals. Boiling, although simple, has been found impracticable on active service on account of the fuel required, the time taken to heat and cool the water and the weight of the apparatus required. This method, however, can be used for small bodies of troops or in emergencies.

Chemicals

Potassium Permanganate has been extensively used. As it is quickly destroyed in waters containing much organic matter the quantity required varies. It is generally used in sufficient quantities to produce a faint pink color,

FIG. 3.
DIAGRAM SHOWING SECTION OF A PORCELAIN FILTER

with average waters this requires less than half a grain to the gallon, which is not enough to ensure that the germs are killed in a reasonable time. If more is used the water is rendered unpalatable.

Chlorine in the form of chlorinated lime is useful for purifying water on a large scale. 25 grains per 100 gallons should be used and thoroughly mixed. A slight taste is given to the water by the chlorine, but this will disappear after a few hours exposure to the air.

As regards the relative merits of those different methods of purifying water in the field, heat is the most reliable, and for standing camps or posts which will be occupied for any considerable time it is to be preferred to all other methods.

The present official method of purification is filtration by means of the service pattern filter water cart, which has been adopted as being the means most generally serviceable under all conditions.

Sanitary Conveniences for Soldiers

Showing How the Troops are Furnished with Sanitary Conveniences at Winnipeg—A Novel Design Hurriedly Prepared, Proves to be Very Effective—

By James Smith, Chief Inspector of Sanitary Engineering, Winnipeg.

SHORTLY after the outbreak of war, and when it was necessary to accommodate our soldiers in buildings not erected for that purpose, the question arose as to the best method of providing lavatory conveniences of a temporary character and yet sanitary. The Plumbing Department of the City of Winnipeg was invited by the district military authorities to advise on the matter, with the result that types of water closets, urinals and ablution tables were designed, and have proved very satisfactory.

The first installation was made in the Horse Show Building under adverse conditions, as only three days were allowed by the military authorities for the design to be worked out and the work completed. The contractor, however, had the 4-inch water main and 6-inch sewer laid into the building, the fixtures completed and in working order a few hours before the battalion arrived from Sewel Camp to occupy the building. Although the work was done hurriedly, it proved so effective that the same design exactly has been followed in the buildings since utilized for barracks with excellent results.

Drawing No. 1 shows a range of water closets usually made in ranges of 12 to 15 seats. The trough is formed of heavy galvanized sheet iron, supported on wooden forms, and is egg shaped. It is syphon eduction in its action, and one excellent feature is that the syphon action can be regulated (and this is the practice) so that almost all the foul sewage is syphoned out of the trough before the flush tank starts flushing. In this way a better scouring action in the trough is obtained by the first portion of the water entering it from the flush tank, and after the water in the flush tank goes below the break syphon A, the balance of the water simply fills the trough with about 8 inches of water.

This result is obtained by using an inverted ball cock, so that when the water reaches a certain level in the tank the ball cock opens and water rushes down pipe E, thereby inducing a syphonic action through pipe B on the 5-inch trap No. 1; and, as I have already stated, this action can be accurately regulated by valve G2, so that the tank does not commence flushing till the trough is almost emptied.

Drawing No. 2 shows a range urinal constructed on the same principle as the closets. The length of these ranges varies from 20 to 50 feet, and some are L-shaped, but this does not materially affect the working of them, as excellent results have been obtained from L-shaped ranges even 60 feet long. In the urinal ranges about 3 inches of water is maintained at the deep end of trough, consequently about 2½ inches of fall is all that can be given, no matter how long the range is, so that there is at least ½-inch of water at the high end of trough.

It can be seen from drawing No. 3 the general arrangement of the fixtures; the floors are also covered with heavy galvanized iron, and provided with floor drains, so that they can be hosed out every day. The accommodation provided varies with the number of troops quartered in the building, the water closet accommodation being figured out at 5 per cent.

I have made inquiries as to the cost of

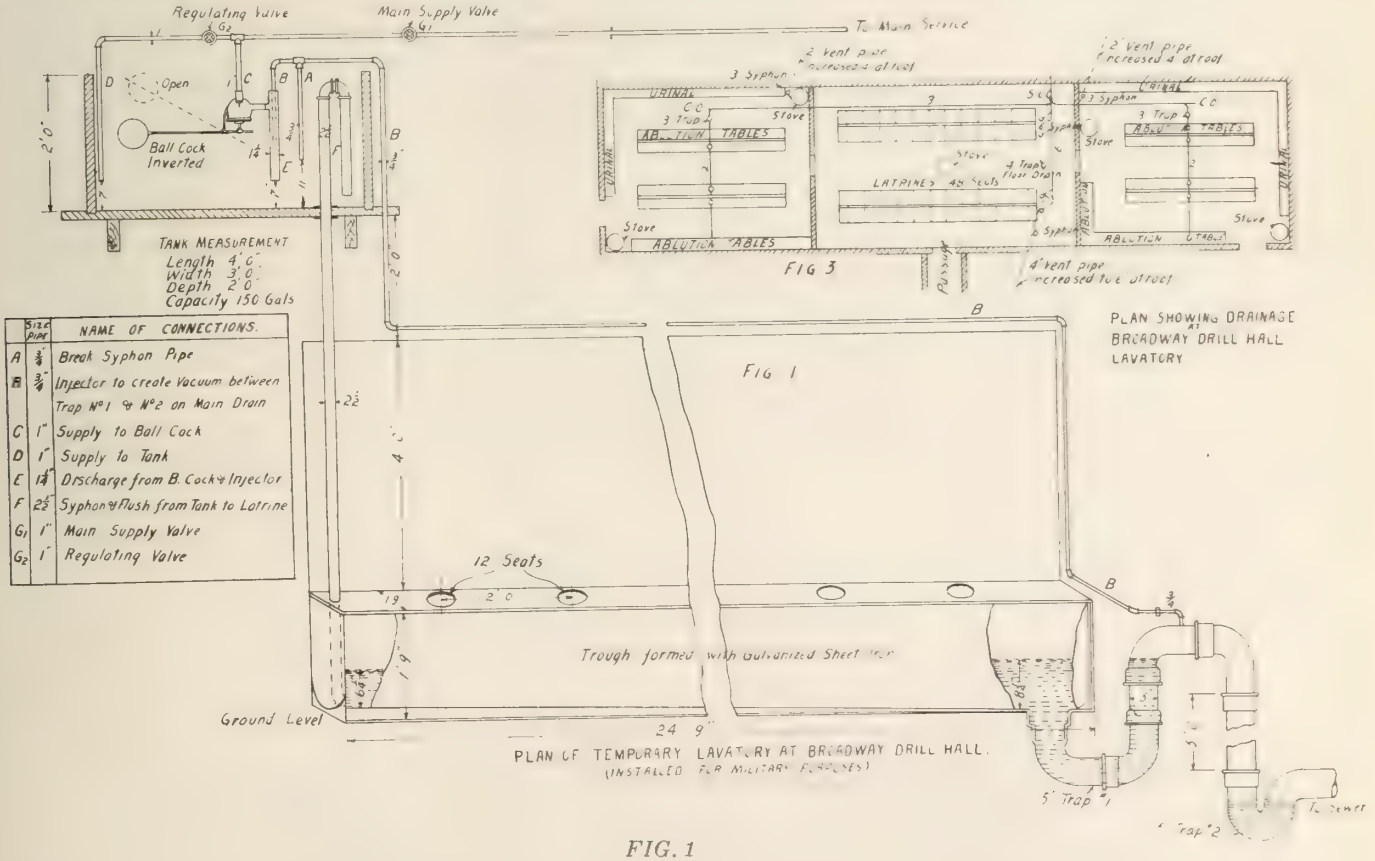


FIG. 1

this work and find that provision for a battalion costs approximately $1 per head, which is a very reasonable figure; and as in most plumbing installations the comfort of the individual and the benefit to the community from a health standpoint are out of all proportion to the monetary expenditure.

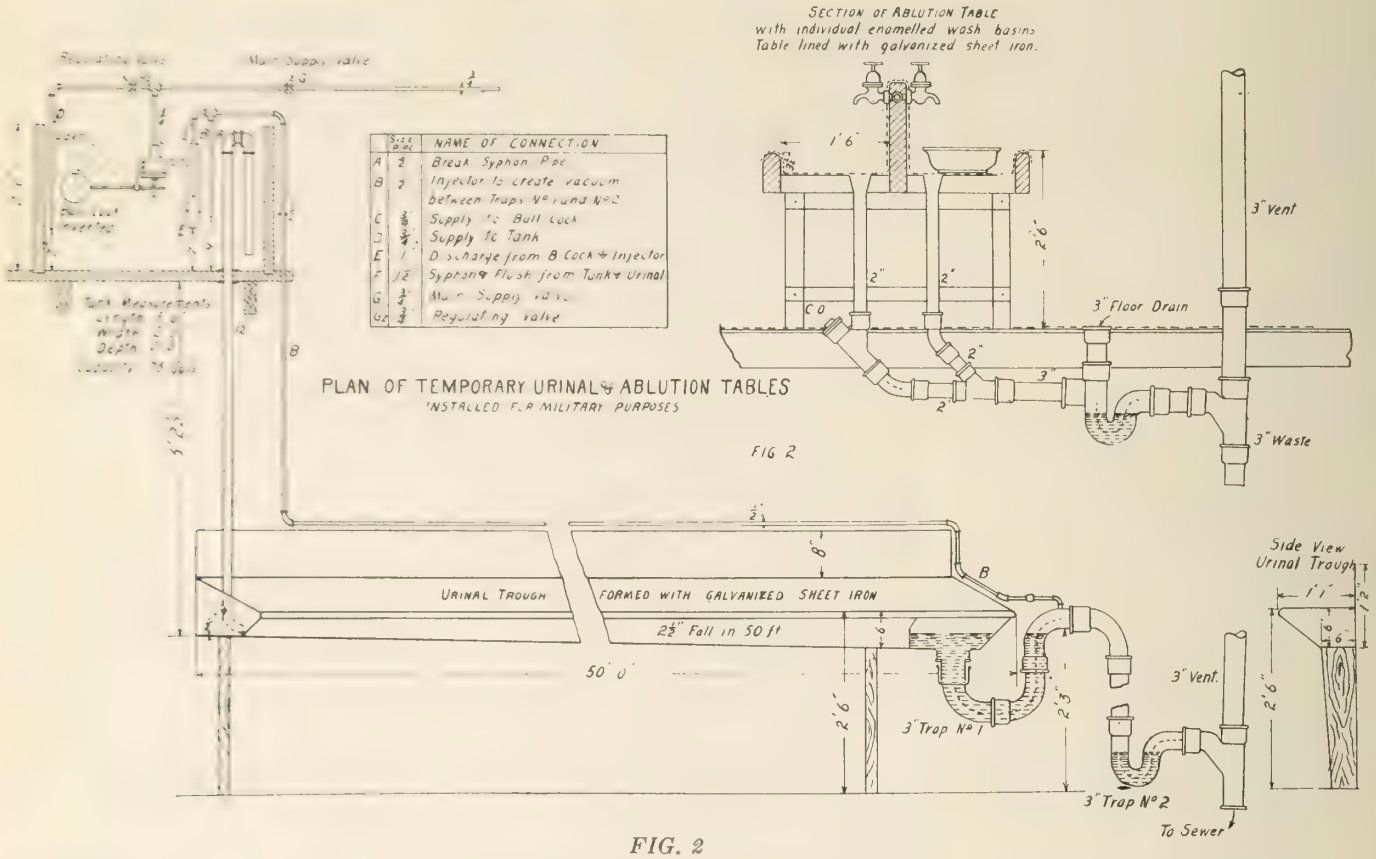


FIG. 2

Considerable credit is due Mr. C. D. Kirk, a member of the Canadian Institute of Sanitary Engineers, who was the contractor in the first installation of this kind, for many of the details shown on these drawings. Mr. Kirk has recently enlisted with the Engineers for overseas service, and is now quartered in Ottawa.

PURE WATER SUPPLY IN ZONE OF WELLAND CANAL

In his statement as Acting-Minister of Railways and Canals, Hon. Dr. Reid said: "The construction of the Welland Ship Canal will interfere with the domestic water supply of several municipalities. This has been the subject of consultations and conferences between the municipal representatives and Mr. Cochrane and his superintending engineer, and a tentative agreement has been entered into between the department and the different municipalities under which the department is to assume the cost of building a pipe-line to carry water from Lake Erie to the reservoirs of the municipalities of Welland, Merriton, Thorold and St. Catharines, to supply pure water in place of the polluted water which will enter the canal through the Welland River, when the river is absorbed in the canal system.

The department assumes the cost of building the pipe line, and the municipalities are to pay a fixed annual rental for the same. No actual work has been done in connection with the proposed pipe line, although experiments are being made on a three-hundred-foot piece of thirty-inch reinforced concrete pipe, which is being built at Port Colborne. Should these experiments turn out successfully this system of construction will be recommended for adoption. It will take about two years to complete the line after active operations on it are begun.

A NOVEL WAR FUND

When the war broke out, almost every body asked the question:— "How can I best serve my country? or what can I do which will help those who are gone to fight?"

The staff of the Warden King Co., realized that some such questions had to be answered in as practical a manner as possible and arrived at a very practical as well as commendable decision.

Started a War Fund

No concern in Canada have lost a larger per cent. of men than has this Company, and as the different men left the question of providing for those whom they left behind loomed into prominence. So the staff remaining, along with the co-operation of their chief, started a war fund.

The scheme is, that every member remaining on the pay roll, pays a certain per cent. of his salary each week into this fund and in that way no one is left unprovided for.

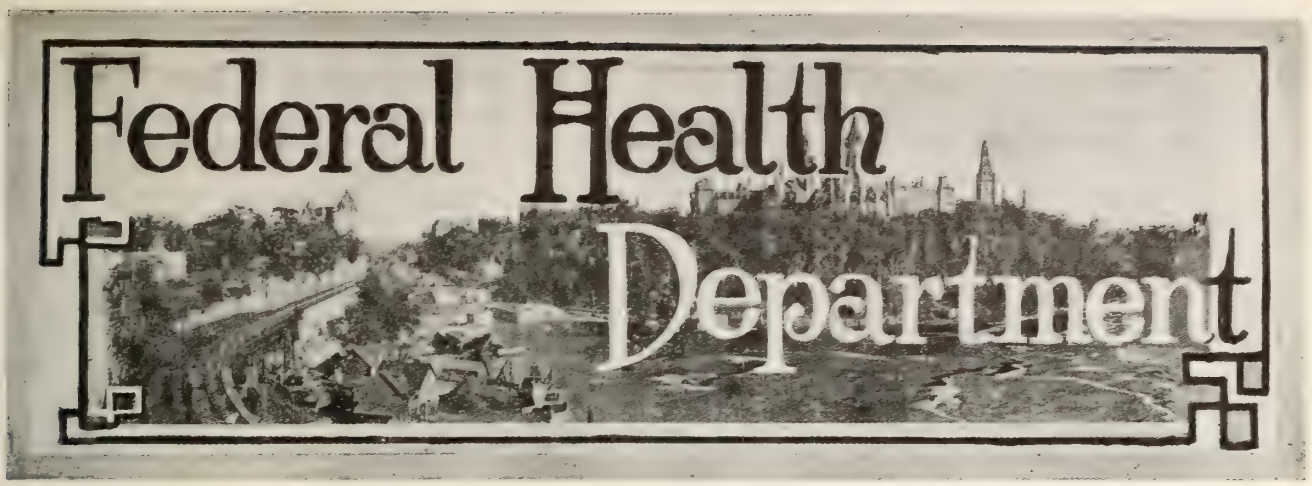
This is what we would term a real patriotic war fund, and those members of the Warden King staff who are not doing their bit with the boys at the firing line, can remain behind with a clear conscience that they are doing their bit for the boys who have gone.

There are thousands who no doubt could go and fight, but who can do and are doing more for those that are gone, by staying at home and keeping our industries going. These industries require men to look after them just as much as do the Huns and when Kaiser Bill has been trimmed good and for all time his trimmers will come back and find business as usual, drop into their vacated positions and enjoy a lasting peace.

RAISE IN RANKS

Sergeant-Major R. G. Henderson, of the 134th Battalion, has been raised in rank, and is now battalion sergeant-major. This battalion has gone into the camp at the Exhibition Grounds, Toronto.

Go to it, Robert, say we, may you become General Officer Commanding of your regiment of Highlanders.



(Continued from last issue)

CUBA, which at the time of the Spanish-American War was a plague stricken land, was, under the administration of the United States health service, cleared of malaria and typhoid, within a few years of the close of that war, and transformed into one of the garden spots of the world. The greatest thing tha he Unied States has done for Cuba and Porto Rico since the close of the war has been its contribution to those countries of good health and sanitary science.

When the French endeavoured to build the Panama canal their attempts ended in utter failure, owing to the prevalence of disease in that section of our continent, but Surgeon-General Gorgas, by the application of modern science, destroyed the plague producing agencies and made the construction of this great work a possibility and an assured success.

Our minds are centered to-day upon the great European war, and it may be interesting to know something about what medical science has done for our armies.

Typhus fever in Scotland in 1865 was responsible for a death rate of 108 per 100,000 of the population. This disease, with its unnumbered tens of thousands of sick and its thousands of dead, has practically vanished in the last fifty years—and its extirpation is a triumph of administration. Typhoid fever, the scourge of armies in previous wars, has, through scientific methods adopted for its control, become in the present war a minor cause of disease in all armies except those in the Balkans, where sanitation was neglected. The history of smallpox is little less striking. With a death rate in Scotland fifty years ago of 35 per 100,000, it has been reduced until it is less than one per 100,000. With antitoxin, diphtheria has lost its chief terror.

In England and Wales the death rate for the five years from 1861-65 was 21.4 per thousand personns living. From that date the death rate gradually declined, until in 1908 it had fallen to 14.6 per thousand living. Under the improved methods of medical and sanitary science there was a saving from death of seven persons per each thoussand living, or a total saving of 245,000 lives in that year for England and Wales. Amid all the tumult; amid cries of anguish and defeat; amid thunderings of artillery, stands on the European battle plains the man of science—a conqueror, undismayed, bringing life and healing to fields of death. He has cut our casualities in two. The bullet has always been a great enemy of human life and safety, and it has a brother in the bacillus; in fact, the bacillus has generally been considered a greater enemy than the bullet. Disease has been the soldier's deadliest foe. In the Crimea, 6,000 British, 80,000 French and 800,000 Russian soldiers died from fever. In 1870, in the Franco-Prussian War, for every 10 Germans killed, 15 died form disease. In 1877 in the Russo-Turkish War, for every 10 Russian who were killed, 27 died from disease. In Britain's campaign in Egypt, for 10 British soldiers killed, 42 died from disease. In the Spanish-American War at one time 20,000 Americans out of an army of 100,000 were ill from typhoid. In the Boer War, there were 60,000 typhoid cases in the British Army, with 8,000 deaths, and for every 7 soldiers killed by bullets, 10 were killed by disease. Disease, not cannon, has swept away the great armies of the past. For years we have had the power to banish half the disease of the world, but we let our power lie idle, and let people die. But war is a great master. It can nationalize railways in an afternoon. It can take over coal mines, close public houses, seize factories. It can take a useless citizen, put him in khaki and make a man of him. So science became clothed with the power of war. While men in the trenches were keeping the Huns back, men in the laboratories were keeping back that unseen enemy, disease. The British Army in South Africa was more severly smitten by invisible foes than by all they met in the open. But there was one wise nation, Japan. It remained for her to teach the Governments of Europe how to apply the knowledge they had given to the world. Japan went to war with science on her side, and for the first time bacilli were less deadly than bullets. There had never been a war with so little typhoid or so few deaths from wounds. Never had there been an army with so little typhoid or so few deaths from wounds as the Japenese army which took part in this the Russo-Japanese War. Sir Frederick Treves, who observed what happened on that occasion, declared that Russia had been beaten by an English Quaker named Lister. It had been demonstrated that medical science could save men by thousands and tens of thousands, and at last governments knew it. Admiralties and War Offices knew it; and so it comes about that, for the first time in the history of war, a British army has been equipped against its greatest foe. Science has armed it so effectively that with the greatest British army ever placed in the field, the cases of disease were even less than under conditions of peace. Science makes our soldiers typhoid proof, cholera proof, and tetanus proof. These three enemies are beaten for all time. Under former sanitary and health conditions, and with armies fighting amid the present surroundings, probably typhoid would have claimed 100,000 victims by this time. That it has not is one of the great victories of the war. When all is over, it will be seen that the merciful science developed by France and Britain has saved hundreds of thousands of the lives of the men who are giving their all to save to the world its civilization and its freedom. If we can conquer disease in war, we can overcome disease in peace; and the nations that have seen what science has wrought in France and in Flanders will be unwilling in years to come to let their people die when

they might live. Canada will be one of those nations. These form a minor part of the story of the progress and accomplishments of medical science during recent years and indicate in some small measure what we may expect in the future.

Canada has only begun the business of nation building, and at this period when the great European war has demonstrated most clearly the advantage of good health among our young men especially, it is opportune that this Parliament should become aroused to the need of devoting more attention to the health of our population, for it is the physical, mental and moral quality of our people that will establish our position in the world. The future is before us; men of science have afforded us the means of avoiding the errors of the United States and European countries. If we do not build up in this Canada of ours a nation which will surpass physically all others of past history, it will be because of the incapacity and the indifference of the public men of the present day.

Public health is a great social and economic question, one of the most important that any nation has to face at the present day. First, there is the matter of feeble mindedness, so closely associated with immigration which is directly under the control of the Federal Government. At the close of the present war there will undoubtedly be a very large influx of immigrants both from Europe and the United States. It is estimated that in Great Britain there are about three hundred thousand feeble minded. In the United States there are an equal number, rapidly increasing. It is most important, therefore, that the greatest care should be taken in the inspection of our immigrants, as the above figures indicate a fruitful source of supply of mental defectives. It is open to doubt whether our present methods of inspection are all that are required. It seems to me that none but trained experts, qualified for the detection of mental as well as physical ailments, should be in charge of this work.

In 1914-15, 59 immigrants were rejected on account of imbecility, and mental defect, but in the same year 154 were deported for similar causes; while in the last three years 606 deportations have been made for these causes. Doubtless many of those deported were the offspring of parents whose history, if inquired into in their home lands, would have prevented the immigration to Canada of these deported persons.

To show the prevalence of feeble-mindedness in our country, let me quote the results obtained at a special clinic for feeble minded, conducted by the Toronto General Hospital for twelve months from July 1, 1914, to July 1, 1915. During that time there were discovered 425 feeble minded persons, of whom 203 were Canadian born and 222 foreign born, showing again that considerable numbers of feeble minded are gaining admission to our country.

Recently a carefully conducted examination of 2,064 children in four schools in Toronto by a specialist from the feeble-minded clinic of the Toronto General Hospital showed almost four per cent. to be feeble minded. We have no statistics to show how many mental defectives we have in this country, but it undoubtedly numbers thousands. Some one has said that the greatest menace to race generation to-day is our ever-increasing population of inefficient and feeble minded. Our first duty is to strengthen the inspection of immigrants. A feeble minded immigrant may in one or two generations cost the state thousands of dollars annually. Let us in this country not repeat the mistakes of the United States, where the care of the insane per annum is costing thirty-two million dollars.

To emphasize the danger to Canada, look at New York State where the authorities have given the subject more attention than in any other part of America. There are in that state thirty-two thousand feeble minded in a population of ten million. Of these only 4,900 are cared for. Of the balance, 7,000 are girls and women of child-bearing age, and they are producing children at nearly twice the rate of normal women. A very large percentage of these children will inherit the mental weakness of their mother and go on adding to the already tremendous burden of providing for the mentally deficient of the state. Let Canada wake up to the threatening danger in this regard: let us profit by the warning given us by New York State.

Infant mortality is another subject which is becoming a great national problem. Our present knowledge of infant life, and the measures taken for the prevention of deaths among infants, guarantee that about 47 per cent. of those dying under one year of age could be saved, and that 67 per cent. of all diseases that afflict children under five years of age are preventable.

John Burns said: We are beginning to concentrate on the child. Why should the state spend so much on inducing immigrants to come to our land, and so little in attempts to save our own native born children. Infant sickness and mortality is one of the greatest preventable wastes of to-day. We have in Canada no statistics regarding the economic loss to the nation through sickness of the people, but figures from United States will suggest to us something of our loss.

There are no complete vital statistics collected for the Dominion, the registration of births, marriages, and deaths being under provincial control. New Brunswick collects none, and there is no uniform system in the other provinces in the method of collection.

Returns available for 1911.

Province.	Births	Rate per 1,000	Deaths	Rate per 1,000
Alberta	8,813	23.52	3,618	9.69
B. Columbia..	5,841	14.88	3,660	9.32
Manitoba	15,918	34.93	5,481	12.03
Nova Scotia..	12,322	25.03	8,237	16.73
Ontario	57,235	22.68	34,341	13.61
P. E. Island.	1,497	15.97	1,114	11.89
Quebec	74,475	37.18	34,904	17.92
Saskatchewan.	8,745	17.76	2,727	5.54
Yukon	48	5.64	87	10.22
	184,894		94,169	

Total births, 225,000 estimated.

Deaths under 1 year, 26,325—117.7 per 1,000 births.

Could be saved, 12,361—47 per cent. of deaths.

We have in Canada no statistics whatever. Even our efficient Department of Labour has not collected statistics along this line showing the great economic loss to the nation from the sickness of our people, but I may be permitted to use some figures from the United States which will suggest to us something of our loss. Dr. Irving Fisher in his report on "National Vitality" estimates the total financial burdens placed upon the people of the United States from sickness, including loss of wages, at two billion dollars per year. The average cost per family is $110, including loss of wages. Three million are sick at one time and the Bureau of Labour estimates that about 25 per cent of heads of families are idle three weeks or more each year from sickness among working men. The largest burden falls upon the poor and middle classes. Sickness therefore becomes a very important cause of distress and poverty. Sydney and Beatrice Webb say in their book: "Prevention of Destitution."

"We are apt to forget that in all countries in all ages it is sickness to which the greatest bulk of destitution is immediately due."

Dr. Edward T. Devine in "Misery and its Causes" says:

Ill health is perhaps the most constant of the attendants of poverty. It has been customary to say that 25 per cent. of the distress common to charitable societies is caused by sickness.

Prof. Lloyd, of the Department of Economics, Toronto University, says:

Among the social causes of poverty none is of more importance than preventable sickness.

Many countries recognize these facts and by legislation have attempted to alleviate the conditions. Sickness insurance in some form or other has been adopted by every European nation except Roumania and Serbia. Lloyd George's Insurance Act of 1911 is a plan for handling much of the social problems of sickness. The social consequences of sickness must be considered. Disease produces poverty and destitution. Destitution and poverty lead to disease. So it goes in a circle.

Rural Sanitation

A Continuation of the Sanitary Science Course That Has Been Appearing in the Sanitary Engineer, But Having Particular Reference to the Sanitary Disposal of Household Wastes in Unsewered Districts

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

IT is now just a year since this course was commenced. For those to whom the course has been of interest, the accompanying synopsis of the various articles is given to make reference convenient.

The books relating to the subjects treated are numerous; in most public libraries many are no doubt available. It is rather remarkable how few engineers take full advantage of the free technical libraries at their disposal. There are two books that deserve particular mention and which can be recommended to the reader anxious to begin the study of Bacteriology and Chemistry. They are:

Bacteria in Relation to Country Life by J. G. Lipman, New York MacMillan 1909.

Chemistry and its Relation to Country Life by J. G. Lipman, New York MacMillan 1909.

A knowledge of both chemistry and bacteriology is essential if one desires to understand the vital facts of life

The very important part that bacteria (frequently also termed germs or microbes) play in our daily lives is the point on which particular emphasis must be laid. On a correct understanding of bacterial action, whether harmful or beneficient, depends our success in dealing with sanitary problems. Of many communicable diseases the particular bacteria causing the disease are known and have been studied. There are other diseases, however, of which the bacteria or agents causing the disease have as yet remained undiscovered or unseen under the microscope in single or colony growth. But the fact that they are known, from other evidence, to be bacterial diseases enables the necessary sanitary precautions to be taken for the suppression of the bacteria or similar agents and prevention, in as far as possible, of the spread of the disease. Take for example such as apparently simple matter as a common "cold". This is now recognized as being caused by bacteria or germs but as far as the writer knows the particular causitive bacteria have never been discovered or studied. In an interesting article recently printed in the Daily Mail, London, Eng., it is shown how all epidemic of colds may be started.

At some given time the weather conditions become favorable for the multiplication of the germs. Usually the same weather conditions reduce our resistance to the attack of these germs.

Then all the very susceptible people and those who are more or less run down become infected and develop colds.

Now, it is probable that most of the less susceptible people, the majority of the population, would escape if they had only to contend with the direct attack of the germs.

But these germs getting a superabundance of nourishment in the noses and throats of the first victims, grow lusty and restless, become more virulent, and by the time they are transferred to the noses of the less susceptible people they are so powerful for evil that there is no resisting their attack.

Thus while a minority get their colds direct from the germ laden air the majority owe their misfortune to the coughers, sneezers, and handkerchief users in public places.

Anyone who doubts this theory can easily test it for himself. He has only to keep notes of the beginning of his colds and of all the circumstances which can in any way account for them. A cold makes its appearance usually between four and twenty-four hours after infection. Some of the virulent cases may take longer to develop. Let the inquirer therefore note well whether he has been in the company of anyone with a cold four

SYNOPSIS OF PREVIOUS CHAPTERS

ARTICLE 1—April 1, 1915.—Sanitary Science defined as the science pertaining to the maintenance of health and to the prevention of disease, both of communities and individuals. The importance of bacteria (some as harmful and others as beneficent) pointed out in relation to the affairs of human life. The means employed in determining if a water supply is pure. The subjects to be discussed in future articles to come, generally, under headings of Bacteriology, Sanitary Chemistry, Sanitation.

ARTICLE 2—April 15—Bacteriology—A discussion of some of the characteristics of Bacteria.

ARTICLE 3—May 1—Bacteriology (continued.) Chemistry, symbols and terms explained.

ARTICLE 4—May 15—Chemistry (continued.) The chemistry, inorganic or organic, required for the purposes of the sanitation defined as Sanitary Chemistry.

ARTICLE 5—June 1—Bacteriology of plant and animal life. The general action of disease bacteria in the human body.

ARTICLE 6—June 15—Bacteriology (continued.) Physical properties of Air.

ARTICLE 7—July 1—The Bacteriology and Chemistry of Air.

ARTICLE 8—July 15—Ventilation from a sanitary stand point.

ARTICLE 9—August 2—Ventilation (continued.) Properties of Water. Hydrostatics, the science dealing with water at rest.

ARTICLE 10—August 16—Hydraulics, the science dealing with the flow of water.

ARTICLE 11—September 1—Hydraulics (continued.) The hydraulic ram.

ARTICLE 12—September 15—The hydraulics of pumps. The Geology of water supply.

ARTICLE 13—October 1—The Geology of Water Supply (Continued.)

ARTICLE 14—October 15—The Sanitary Inspection of Water Supplies.

ARTICLE 15—November 1—Reports of the Commission of Conservation Relating to a Sanitary Inspection of Rural Water Supplies in the Dominion.

ARTICLE 16—November 15—Typhoid Fever, a disease which it is the special province of the sanitary engineer to prevent.

ARTICLE 17—December 1—Other bacterial diseases. The value of proper ventilation, sunlight and dust prevention in fighting such disesaes.

ARTICLE 18—December 15—The sanitary analysis of water—Physical Examination.

ARTICLE 19—January 1—Physical Examination of Water (continued.) Microscopical examination of water.

ARTICLE 20—January 15—Microscopical Examination of Water (continued.) The collection of water samples.

ARTICLE 21—February 1—The Collection of Water Samples (continued.) Chemical examination of water samples.

ARTICLE 22—February 15—The bacteriological examination of water, the most difficult but most important examination.

ARTICLE 23—March 1—Water Softening. Water Purification. Filters.

ARTICLE 24—March 15—Water Purification (continued.) Sterilization by boiling and chlorination.

to twenty-four hours before his own symptoms have appeared; or whether he has travelled in a public conveyance with one or more coughers and nose blowers. In nine cases out of ten he will find that as long as he has been able to avoid infection in this way he escapes the cold; that whenever he gets a cold he has been in the company of or in proximity to someone already suffering.

This same article deals with the expense caused by colds reading as follows:

None of our public men has interested himself in the war economy to be effected by the measures that would limit the distribution of the germs of colds. The cost of these slight illnesses is enormous. If we allow two colds per head of the population every year the total number is over ninety millions. Many are serious and call for medical attention; many lead to permanent bronchitis, pneumonia, or possibly to consumption. Among the working part of the community the lowering of efficiency and in many cases the cessation of work for a day or two involves great loss. Allow half a crown as an everage expenditure, lumping big and little cases for medicines, mustard baths, poultices, etc., and we get a total of £11,250,000. Allow another average five shillings for loss of time and efficiency in half the population and we have the £11,250,000 more—a total loss by colds of £22,500,000.

In the article certain rules are given which if observed should have the effect that colds and coughs would not last so long and they would be far less numerous. The rules are explained in the following paragraphs.

To himself the cougher is an enemy because, whenever he coughs, instead of making the smallest effort necessary to clear his bronchial tubes, he puts his whole soul into the attempt. Most men cough with a horse power approaching that of a Dreadnought, when less than that of the smallest motor boat is all that hygienic coughing requires. This should be a rule for everybody with colds; cough as gently as possible to save the delicate bronchial tubes from injury; blow the nose with the smallest successful effort or you will drive the infection further into the recesses of the nose, probably into the throat and possibly into the ears, besides congesting the eyes and the brain. Then as regards the other people, think what a cougher or a man who flourishes a handkerchief in the faces does for them. Every time he coughs he ejects enough cough germs to transfer his complaint to a hundred people. Every time he pulls out his handkerchief he scatters countless millions of the same germs.

For the sake of his fellow beings, therefore, the man with a cold should obey certain rules.

When you cough in the presence of other people always cover your mouth with your handkerchief or hold a newspaper before your face.

When you take your handkerchief out of your pocket do so with the least possible agitation of the article, and never flourish and shake it about.

The points in regard to colds which should be noted by every citizen but particularly by the sanitary engineer who should be a leader in such matters, is that with proper sanitary precautions not only could much suffering or inconvenience be avoided but that also great economic loss could be prevented. Everyone who coughs in a public conveyance, a theatre or wherever other people are present without covering his mouth, and everyone with a cold who flourishes his handkerchief in the same circumstances may infect two or three of his neighbors and cause a loss on the basis of the estimate in the Daily Mail article of from approximately $4.00 to $6.00.

While there are undoubtedly vast armies of disease bacteria to be fought many are being sucessfully fought. Communicable diseases are not so feared as they once were nor is the death rate so high. Malaria which was once so prevalent in Ontario is now practically never heard of. The animal bacteria of protozoa causing the disease, as far as Canada is concerned, have been exterminated. We may hope for the time when all disease bacteria have ceased to exist. Up to the present we have been considering what harm these objectionable bacteria may cause but there are on the other hand probably more bacteria in this world of a class that are friendly to the sanitary engineer. All that the engineer need do is to furnish these seavengers, these domestic purifires, the proper conditions under which to work and they will never fail to attain results. It is almost beyond imagination to think what would happen if there existed no longer these bacteria which now enable the chemical changes to take place in all waste organic matters thus completing the cycle of life in its various phases of growth and decay. To the scientist there is no death—only life in different forms.

In the sanitary disposal of human excreta and other household wastes these friendly or beneficient bacteria are of particular value. In some of our cities and towns served by sewers adequate provision is made for the safe and sanitary disposal of sewage but unfortunately this as yet does not apply to all. In these articles, however, we are concerned with the disposal of household wastes in districts that are not sewered.

In order that the forthcoming articles may be easily distinguished from past articles and especially now that they will refer most particularly to the sanitary disposal of household wastes in rural or unsewered districts, the title of these articles will be changed in the next issue to "Rural Sanitation." The chemistry and bacteriology of sewage disposal will be briefly treated and various kinds of domestic disposal plants illustrated and commented upon.

COURTESY AND BUSINESS

It requires more than mere money's worth to satisfy a customer. Business cannot be completely organized like a machine. The day will never come when folks will be satisfied simply with honest value.

Personality is essential in every organization. Human nature demands a smile and "thank you" as extra measure. Sentiment plays a tremendous part in determining profits and losses. Good will is a valuable asset. Whenever a long established concern passes into new hands, sums of money often exceeding the amount laid down for realty and equipment are demanded for the close bond of friendship which has gradually grown between the merchant and the trade.

We all form our prejudices and we esteem them fondly. Every man has a profound dislike for some shop—some corporation—some hotel or railroad, because of an unpleasant experience with a proprietor, an official, or an employee. Men and women will put up with personal inconvenience rather than patronize institutions which have courted their hostility.

If you serve in any capacity, it is part of your job to exhibit gratitude for favors. You are being paid a profit for your wares, your facilities and your time, and even if you do occasionally encounter an unreasonable human it is no less than common sense to meet rudeness with self-control. Wherever employees fail to regard the common rules of breeding and civility, it is because no rules for the treatment of buyers have been established and maintained.

Fortunes can't be built out of shrewdness alone. Brilliant intellects are discounted by a surly disposition or a strain of petty meanness. Little things destroy big opportunities.—H. K.

An Example in Overhead and Profit

A Simple Diagram Showing How to Arrive at the Selling Price of an Article, No Matter What the Invoice Cost May be. The Profit and Overhead Must Always be Based Upon the Selling Price and Not on Invoice Cost

SUPPOSE the invoice cost and freight charges on a lavatory are $10.50, the overhead expenses 20 per cent., and a profit of 10 per cent. is required, what would the selling price of the lavatory be?

Note the accompanying diagram of squares.

Here is a square, divided into 100 smaller squares, equalling 100 per cent.—the selling price.

The first two rows of 10 squares represent 20 per cent. overhead.

The third row of 10 squares represents 10 per cent., which is the desired profit.

The remaining seven rows of squares, 70 in all, will represent the invoice cost $10.50.

But, before we can arrive at the actual selling price, the overhead and profit percentage must be defined.

Now, if the 70 small squares represent the invoice price, $10.50, then one square will be one-seventieth part of $10.50, viz., 15 cents, and if one square equals 1 per cent., then 100 squares will represent 100 per cent., or 100 times 15 cents, viz., $15.

Now, having arrived in this way at the selling price, it is a very simple matter to arrive at the overhead and profit in the following manner:

Invoice cost of lavatory,
70 per cent. of..... $15.00 = $10.50
Overhead expenditure, 20
per cent. of ..... 15.00 = 3.00
Desired profit, 10 per
cent. of ..... 15.00 = 1.50

100 per cent. $15.00

Using the above method, let us suppose that a bath cock cost on invoice is $2.50, and this sum equals only 70 per cent. of the selling price. Then if the invoice price, 70 per cent. = $2.50, the selling price, 100 per cent. = $2.50 $\times \frac{100}{70} = \frac{\$250}{70} = \$3.57$, it will, therefore, be seen that $3.57 is the selling price. We can verify this as follows:

Invoice cost of bath cock
70 per cent. of ..... $3.57 = $2.50
Overhead expenditure,
20 per cent. of ..... 3.57 = 0.71 2-5
Desired profits, 10 per
cent. of ..... 3.57 = 0.35 7-10

$3.57 1-10

Some folk think that figures can be made to prove anything. But here is a simple example, which is true, and not in any particle misleading:

Many a business man will argue that he is making 10 per cent. profit when he is only adding 25 per cent. to his invoice price.

The above diagram and explanation proves that, providing the overhead expense is 20 per cent., and 10 per cent. is desired as profit, it would be necessary to add almost 43 per cent. to the invoice cost.

Now let us still further explain this method by assuming that an article costs $2.50 and the overhead is 10 per cent., with a net profit required of 5 per cent. As the gross profit is to be 15 per cent., the invoice price will represent the remaining 85 per cent. of the selling price.

85 per cent. of selling price equals $2.50, therefore 100 per cent. equals $2.50 $\times \frac{100}{85} = \frac{\$250}{85} = \$2.94$. Therefore, the selling price would be $2.94.

Let us again apply the same rule to verify these figures:

Invoice cost of article, 85
per cent. of ..... $2.94 = $2.50
Overhead expenditure, 10
per cent. of ..... 2.94 = 0.29
Required profit, 5 per cent.
of .... 2.94 = 0.15

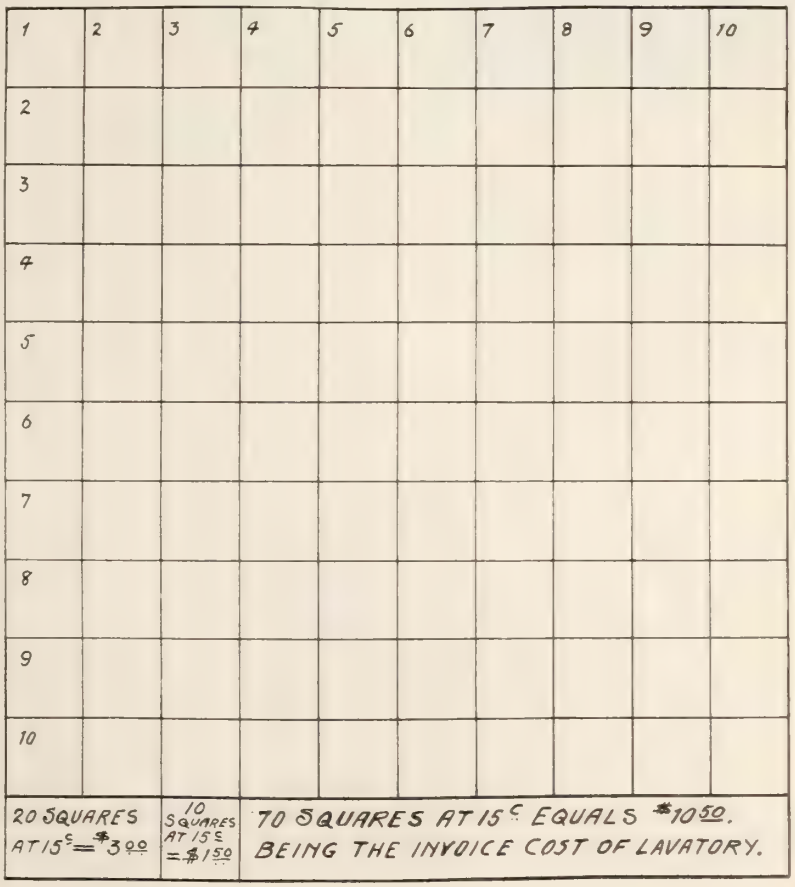
100 per cent. $2.94

It will be seen that no matter what the overhead is, or the profit required, the balance of 100 per cent. is the sum on the invoice, and the selling price can be very easily arrived at by following out the above method. Try it on the very next invoice.

Of course, the overhead must have been previously determined as well as the profit desired.

KEEP DOWN OVERHEAD

Keeping expenses down is not the secret to success in the sanitary and heating trade. Nevertheless the man who can get results on the lowest possible expenditure is the man who spends his declining years in ease and comfort.



TORONTO TRADE NEWS

JOINED THE FIGHTING FORCES

One of the latest to take up arms in the defence of his country is the late vice-president of the Toronto Society of Domestic Sanitary and Heating Engineers, Thomas H. Ferguson, who is attached to the 216th Battalion, as quarter-master sergeant. Mr. Ferguson was connected with the Royal Scots of Edinburgh, Scotland, as color sergeant before coming to Canada, and is one of the few having had the necessary military experience that is so essential at this time. Tom has been acting in Toronto Society affairs for some time, and at the time of joining the fighting forces was officiating as chairman of Executive Committee for 1916. He carried on business at 2531 Yonge street, in North Toronto, or what was called Eglington before it became part of the City of Toronto, where he was one of the first to locate. The business will be continued under the supervision of his superintendents of heating and plumbing, who are well aquainted with the special attention always given by Mr. Ferguson to all work entrusted to his care.

Tom has the best wishes of his fellow craftsmen in his new field of enterprise and Mrs. Ferguson and their three children are extended the best wishes of the entire craft.

JOINED 48TH BATTERY

Another of the Executive Committee of the Toronto Society of Domestic Sanitary and Heating Engineers, has enlisted in the person of Harry Griffith, of the firm of H. Griffith & Co., 1128 College street.

Harry has been a member of the Toronto Society for several years, and always took up his end when the occasion arose. He was one of the famous battery of the Sanitary and Engineers' [illegible] team of 1915, and that accounts for his joining the 48th Battery which is stationed at Exhibition Park, Toronto. This branch expect to go overseas at an [illegible] date, which of course just suits Harry, who always liked quick action, as everything be understood. The business will be continued until present contracts are completed under the supervision of Mr. William Myles, who has had charge of the office details of the business.

Mr. Griffith has two children, a boy and a girl. The Sanitary joins with his friends in wishing him all he wishes for himself and a safe return to his wife and family.

OBITUARY

One of those who has been engaged in the plumbing and heating business in Toronto for many years past, departed this life on Monday, March 26th, in the person of E. J. Stinson, and was located at 21 Russell street, off Spadina Crescent for 15 years. For the past two years Mr. Stinson has been in bad health, and for the past three years has been living retired, having disposed of the business to Mr. G. S. Pippey, who formerly was connected with E. Lewis LeGrow in the capacity of foreman for 11 years, and has continued the business in the old stand.

NEW TORONTO MANAGER FOR WARDEN KING LTD.

When Capt. Ernest Laidlaw the late manager of the Toronto branch of Warden King Ltd., joined the fighting forces, along with 7 other members of the staff, it meant quite a number of new appointments, and under the steady guidance of the congenial Charles Webb, manager of the sales force at Montreal, all difficulties, if such they could be called, have been surmounted, and a new Toronto manager appointed in the person of Fred E. Ellis.

Almost every body in the sanitary and heating business knows Fred. For upwards of 12 years he has been interestedly employed in the business in a number of capacities.

Four four years he labored under the guidance of the officials of the Gurney Foundry Co., Ltd., Toronto, followed by a couple of years with the Gurney Tilden Co., Ltd., of Hamilton. The next step was to join the staff of A. Welch & Co., Ltd., in the constructional end of the business in which capacity he was employed for 5 years.

It will be readily seen that Mr. Ellis cannot fail to have gained a lot of valuable experience which will no doubt have fitted him for the position as manager of the Toronto branch of this well known concern. The sanitary engineer joins with the many friends of Mr. Ellis in wishing him every success in his new responsibility

THE CANADIAN SOCIETY OF DOMESTIC SANITARY AND HEATING ENGINEERS

President E. H. Russell announces that the twenty-first annunal Convention of the Canadian Society of Domestic Sanitary and Heating Engineers will be held in London, Ont., on Tuesday, Wednesday and Thursday, June 20th 21st and 22nd, 1916.

This will give sanitary and heating engineers throughout the Dominion ample time to arrange for attendance at the Convention, and will permit the members at remote points from London to visit the Convention and still not be away from their business more than a week.

Complete details as to railroad rates and accommodation will be announced later, and if any information is desired in connection with the convention a line to President E. H. Russell. 76 Cathcart Street, London, Ont., or Assistant Secretary Frankland, 1093 Bathurst Street, Toronto, will bring a prompt reply.

Toronto, March 29th, 1916.

Sanitary and Heating Engineers of Ontario

The fifth annual meeting of the Ontario Society of Domestic Sanitary and Heating Engineers will be held at London, Ont., in the third week of June, 1916 in conjunction with the annual Convention of the Canadian Society, which will be held there at that time. Further particulars will be announced in later issues of The Sanitary Engineer.

An important item from the viewpoint of all sanitary engineers in Ontario, and more especially to the members of the above society, is the enactment by the Legislature of the Province of Ontario of an Act to amend the Public Act of Ontario by the addition of the following clauses for the regulating of plumbing throughout the province. This

will ensure the adoption of uniform plumbing regulations for Ontario, as compiled by the Ontario Society and published in The Sanitary Engineer some time ago.

No more important legislation than this can be imagined for the general good health and welfare of our province. It is certainly a direct result of the activities of the Ontario Society of Domestic Sanitary and Heating Engineers in advocating the necessary legislation to ensure a uniformity of plumbing installations throughout the province.

Doubting Thomases, of whom there are quite a few in our craft, will do well to remember the good a provincial association can do for our craft, and to come out of their narrow-minded rut, put their shoulder to the wheel of progress, and

PRIVATE J. HANNEFORD

Steamfitter, recently joined his pals in the 170th Battalion for service overseas.

be All for One and One for All through the Ontario Society of Domestic Sanitary and Heating Engineers.

E. H. RUSSELL, President.
G. F. FRANKLAND, Secretary.

BILL

An Act to Amend the Public Health Act

His Majesty, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:—

1. Section 9 of the Public Health Act is amended by inserting therein the following as clause (dd):—

(dd) The construction, repair, renewal, alteration and inspection of plumbing, the material to be used in the construction of, and the location of drains, pipes, traps, and other works and appliances forming part of or connected with the plumbing in any building, or upon any property, or in any highway, street, lane or public place, and in any structure or place, whether permanent or temporary, constructed or used thereon or therein.

2. Section 13 of the Public Health Act is amended by adding thereto the following sub-section:—

(10) The Provincial Board, every district officer of health and inspector, and every medical officer of health and sanitary inspector, shall have authority to enforce the by-law set out in schedule B, or any amendment thereof approved by the Provincial Board, and any by-law respecting the milk supply of, and any other by-law respecting sanitary matters in a municipality, and for this purpose may institute proceedings for the prosecution of offenders against any of the said by-laws.

3. Section 37 of the Public Health Act is amended by adding thereto the following sub-section:—

(2) A medical officer of health who refuses or neglects to carry out the provisions of this Act or the regulations, or any special order of the Provincial Board, or any by-law of the municipality relating to sanitary matters, may be dismissed from office by the Provincial Board or by the municipal corporation on the recommendation of the board.

4. Section 53 of the Public Health Act is amended by adding thereto the following sub-section:—

(3) Every such notice filed with the medical officer of health shall be transmitted forthwith by him to the secretary of the local board of health, and shall be included in the weekly report required to be sent to the Provincial Board under section 24.

5.—(1) Sub-section 1 of section 103 of the Public Health Act is amended by striking out the word "four" in the third line and inserting in lieu thereof the word "two."

(2) Subsection 2 of section 103 of the Public Health Act is amended by striking out the word "four" in the second line and inserting in lieu thereof the word "two."

6. Section 110 of The Public Health Act is amended by adding the following subsection:—

(4) Every person who sells either publicly or privately any of the biological products supplied to the public free of charge by the Board shall incur a penalty of $100, and in default of payment thereof shall be liable to imprisonment for a period of three months.

7. Section 115 of the Public Health Act is amended by adding thereto the following subsection:—

(3) The by-law set out in Schedule B and any amendment thereof approved by the Provincial Board shall have the same force and authority as a regulation made under this Act by the Provincial Board.

8. Subsection 2 of section 125 of the Public Health Act is amended by inserting after the word "officer" in the first line the words "or officers."

New Members for Toronto Association

At the March meeting of the Toronto Association of Domestic Sanitary and Heating Engineers three new firms were made members: K. B. Allison, George Abbott of Sheppard & Abbott and Chas. chapman of the J. W. Oran Co. The various committees reported on their work to date and the services of G. F. Frankland were retained as secretary for three more months. The action of the workman's compensation board in

PRIVATE C. CLARK

Steamfitter, recently joined his pals in the 170th Battalion for service overseas.

connection with the lowering of rates on the plumbing and heating schedules was discussed with every evidence of the approval of the members.

WINTER SESSION OF EVENING CLASSES ENDED

The plumbing and heating night classes at the Toronto Technical School, have closed for the season, the last class being held on Wednesday evening, March 29th.

These classes have been proving very successful, the attendance being large right up to the last. Full particulars will be published in April 15 issue of The Sanitary Engineer.

John E. Fullerton, formerly secretary of the Toronto Association, who has been instructor of the classes, states that the progress made has been most satisfactory all round. On the resumption of classess in the fall he looks for a larger attendance than ever. The day classes are being well attended.

A HAPPY SOLUTION

A very attractive heating book entitled "A Happy Solution" is being issued to the trade by the Lord and Burnham Co., of Canada, Limited, St. Catherines, the office address being the New Royal Bank Building, corner of Yonge and King Streets, Toronto.

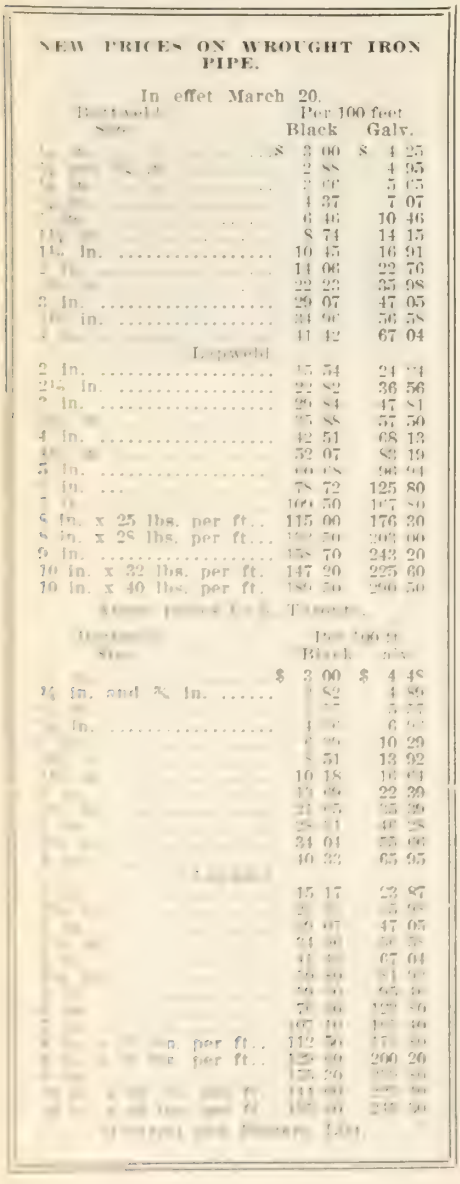
Those desiring to be furnished with one of these catalogues should write the Toronto office for same.

BRASS COMPANY CHANGES NAME

Notices have been issued to the effect that the name of the Chadwick Brass Company, Limited, at Hamilton, has been changed to the Wentworth Brass Company, Limited. The firm founders, spins, stamps and manufactures brass and copper goods, as well as a varied line of plumbers' brass fittings, electric and gas fixtures, automobile lamps and art metal ware.

MOVED TO NEW PREMISES

J. W. Ausman, sanitary and heating engineer, Redcliffe, Alberta, has moved to new premises on Fifth street, next to Patterson's bakery.



NEW PRICES ON WROUGHT IRON PIPE.

In effet March 20.

Size	Per 100 feet Black	Galv.
[illegible]	$ 3 00	$ 4 25
[illegible]	2 88	4 95
[illegible]	3 07	5 05
[illegible]	4 37	7 07
[illegible]	6 46	10 46
[illegible]	8 74	14 15
1¼ in.	10 45	16 91
[illegible]	14 06	22 76
[illegible]	22 23	35 98
2 in.	29 07	47 05
2½ in.	34 66	56 58
[illegible]	41 42	67 04
Lapweld		
2 in.	15 54	24 24
2½ in.	22 82	36 56
3 in.	29 84	47 81
[illegible]	35 88	57 50
4 in.	42 51	68 13
[illegible]	52 07	83 19
5 in.	60 68	96 94
[illegible] in.	78 72	125 80
[illegible]	109 50	167 80
8 in. x 25 lbs. per ft.	115 00	176 30
8 in. x 28 lbs. per ft.	130 50	203 00
9 in.	158 70	243 20
10 in. x 32 lbs. per ft.	147 20	225 60
10 in. x 40 lbs. per ft.	180 50	290 50
[illegible] Taper.		
Size	Per 100 ft Black	Galv.
[illegible]	$ 3 00	$ 4 48
¼ in. and ⅜ in.	[illegible] 82	4 86
[illegible]	[illegible]	5 77
[illegible] in.	[illegible]	6 66
[illegible]	[illegible] 86	10 29
[illegible]	[illegible] 51	13 92
[illegible]	10 18	16 61
[illegible]	13 [illegible]	22 30
[illegible]	21 [illegible]	35 29
[illegible]	25 31	40 58
[illegible]	34 04	55 06
[illegible]	40 32	65 95
[illegible]		
[illegible]	15 17	23 87
[illegible]	[illegible]	[illegible]
[illegible]	29 07	47 05
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	67 04
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	107 10	[illegible]
[illegible] in. per ft.	112 50	175 50
[illegible] per ft.	128 [illegible]	200 20
[illegible]	175 20	[illegible]
[illegible]	111 [illegible]	[illegible]
[illegible]	192 [illegible]	299 50
[illegible] Taper.		

INTERESTING QUESTIONS

In Visiting Several Towns Recently a Number of Interesting Questions Were Put to the Editor. Those Making the Inquiries Have Asked That Readers of the Sanitary Engineer Send in Replies

AT the present time quite a number of towns are remodelling their plumbing by-laws and ordinances, and several questions have been put to the editor of The Sanitary Engineer regarding a number of matters in this connection.

Here are some of the questions which readers of The Sanitary Engineer are asked to answer.

With a view to receiving the various opinions of The Sanitary Engineer readers the editor has been asked not to take part in the discussion.

It is, therefore, desirous that all who possibly can will send in their views as soon as possible.

1.—What kind of bend is best to use between soil pipe and w.c. bowl, lead or iron, and why?

2.—Should lead bath and lavatory waste pipes be wiped into the lead bend (if used)?

3.—If iron bends are used, should galvanized wrought iron pipe be used for the bath and lavatory waste?

4.—Is it necessary to vent a w.c. bend when lavatory and bath traps are vented?

5.—Where a by-law is in force, and enforced, governing the construction of plumbing installations, who gains the greatest benefit from this protection—the sanitary engineer or the public?

6.—Should all plumbing be subjected to a smoke test, as a final test, after all fixtures have been installed and ready for use, and before the installation has been left in charge of the householder for use? If so, why?

When the above questions have been discussed fully and freely, there will be others equally as interesting put before our readers. It is to be hoped that answers will be submitted fully and freely.

No names will be published, if so desired, by those sending in answers; but names and addresses must accompany all replies as a guarantee of good faith.

WINDSOR TO BE COMPLIMENTED

If every town or city in Canada could boast of a medical officer of health who took such interest in matters appertaining to its citizens' health as can Windsor, they would, have something to be proud of. Newspaper clippings prove that Dr. G. R. Cruikshanks is by no means a mere figurehead upon the Windsor Board of Health. He is at present very much interested in having a new and up-to-date by-law put into force governing plumbing and sanitary installations and upon being interviewed by the editor of The Sanitary Engineer recently, it was a pleasant surprise to the latter to find how thoroughly the doctor had gone into the various problems dealing with constructional matters.

The sanitary engineers of Windsor, too, are to be congratulated upon having such an efficient medical officer of health at their service, and, without casting any reflection upon other medical officers of health in Canada, we very much doubt whether there is another man taking such a vital interest in sanitary engineering as is the present medical officer of health of Windsor.

Having taken such pains to study the question of sanitary engineering construction, he no doubt is thoroughly convinced that sanitary plumbing is a very vital factor in our buildings, whether factories, workshops or residences, and The Sanitary Engineer sincerely hopes that every sanitary and heating engineer, whether employer or journeyman, will do all in his power to contribute to the service of the citizens of his city by installing the work in the very best manner possible, thus co-operating in a practical manner with Dr. Cruikshanks.

A CHANCE FOR INVENTORS

That there is a fortune awaiting the man who can invent a motor for automobiles that will consume illuminating or heavier oils of which the supply is excessive, or who can make a competitive substitute for gasoline, is an opinion expressed by the New York Commercial in commenting upon the recent rapid advances in the gasoline market.

NEW METHOD OF LEAD JOINTING

Very novel claims are being made by the Amalgaline Company of Canada for a substance they are now placing on the market for making all kinds of joints which will in time take the place of wiped soldered joints as well as lead burning.

Full particulars will be furnished upon request to the above Company, 186 Manning Avenue, Toronto.

PLUMBING CONTRACT

The Windsor Park Committee awarded a contract to Fletcher & Jones, sanitary engineers, to install sanitary conveniences at Wigle Park.

New Sanitary and Heating Goods

A NEW THERMOSTAT CONTROL

It is not the amount of money which we earn that makes one rich. It's the amount one saves.

The same with gas—when burning gas it's not the amount burned in every case that gives the maximum of hot water, if the gas is not under control.

The Jarvis Heater Co., 114 east Adelaide Street have invented and put on the market a new thermostat control which they claim will, if attached to any gas water heater, make it do the

New Jarvis Thermostat

work of an instantaneous gas water heater.

Full particulars may be had from above address.

EMPIRE MANUFACTURING CO.'S NEW CATALOGUE

Catalogues these days are the business-man's directory to buying, they are published in his interest and in many ways are invaluable to his business.

The Empire Brass Manufacturing Co., Ltd., London, have issued a splendid one. It comprises several hundred pages, and is full of useful information.

One outstanding feature which is worthy of special note is the way in which all manner of repair parts are described.

Those desiring to procure one of the catalogues should write to above address.

INTERNATIONAL MALLEABLE IRON CO., LTD., ISSUES NEW CATALOGUE

A very attractive and well-bound catalogue is being distributed to the sanitary and heating trade by the International Malleable Iron Co., Ltd., Guelph. It is highly illustrated, printed on good coated paper and full of interesting data in connection with fittings of every description.

THE HONEYWELL AIR-SEAL GENERATOR

Without the use of springs, valves, weights, mechanical or moving parts of any kind, The Honeywell Air-Seal Generator produces and maintains a given or

New Air-seal Generator

predetermined low pressure on hot water heating systems.

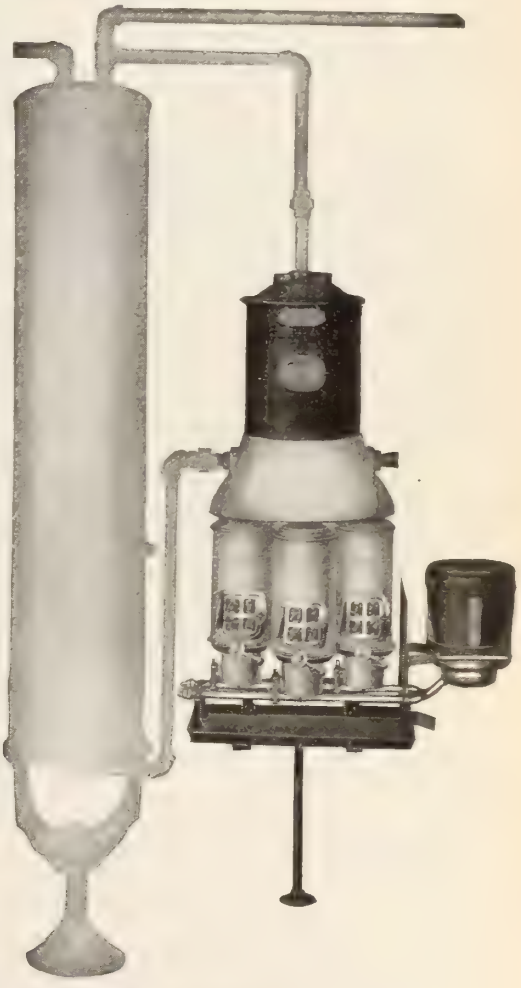
The Generator consists of two simple castings called air separators. The upper separator is placed at some convenient point, usually on the second floor, against an inside wall, behind a door or in a closet. The lower separator is located in the basement, near the basement floor.

For every foot of height between the separators approximately one-half pound pressure is generated, regardless of the number of floors in the building or the height of the expansion tank.

There are numerous ways to install the Air-Seal Generator. All this and more, is clearly explained in a complete catalog published by the Honeywell Heating Specialty Co., Wabash, Indiana. They will be glad to send any reader of Sanitary Engineer a copy on request.

NEW WATER HEATERS

When a sanitary engineer has installed a system of plumbing in a farm or rural home, he is often confronted with the question as to how the householder may procure hot water in the summer time, or at such times when the range



New Perfection Water Heater

is not in operation, very few villages have a gas service in the locality. The Perfection Stove Co., Ltd., Sarnia realized this and have introduced a new line to overcome such a problem. The new Perfection water heater uses oil for fuel, it can be furnished with one or more burners and connected to the range boiler in exactly the same way as the ordinary gas water heater. Full particulars as to prices etc., may be procured from the above address.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

WHY THE SMOKE TEST

Editor The Sanitary Engineer.—We have an inspector in our town who has declared that the smoke test is not necessary, but we know in our own mind and from practical experience that it is. We are sanitary and heating contractors, and, owing to the inspector's opinion, are looked upon as wanting to "put one over" on the public when we say the test is necessary.

We would like you, Mr. Editor, to publish in an early issue your opinion on this matter, and state why the smoke test is necessary. At the same time, if you have yourself any objections to it, we would like to know them.

Are there any circumstances under which a smoke test could be dispensed with, and at the same time could we be sure that the work would not be liable to let sewer air into the building in which the fixtures were installed?

W. N. & Co., B.C.

This question of smoke testing has always been a very contentious matter amongst two classes of craftsmen—those who do not, in the first place, know anything about the trade, and those who don't want to know anything about it except as a means of making money. Both classes are dangerous, and will never make a real success of the business. One of these classes argue that as a matter of fact very little real smoke testing is done, simply because the smoke is not made to travel through every terminal, thus ensuring that the whole area of the pipes under test is filled with [illegible]. They very often call the test is not "a smoke" test.

To a certain extent this argument is true, but here is where these men err in their condemnation of the smoke test, and the reason too why they err.

These men think that the smoke test is simply to find out leaks in the piping of a system, and they argue that the water test has already sufficiently tested this part, and that the only joints to test them are those made at the floors or walls wherever the traps have been fitted.

Such, however, is not the case. The smoke test is necessary after every fixture has been fitted up, and all the trap or w.c. seals have been filled with water. The test is put on, to prove that every trap is properly sealed with water, as well as the joints properly made, which could not be made at the time the water test is put on.

Last year in different parts of Canada reports came in to us that certain w.c. bowls were being found that were defective. In one case fourteen w.c.'s were proved defective as a direct result of the smoke test, and many times a poor workman has been known to "put" the bath trap to such an extent as to damage the seal, and in most cases this trap is under the floor, out of sight.

Now as regards the smoke test not "being a real smoke test." Such is often the case, but let us not lose sight of the principles of the test, which are clearly illustrated in the accompanying drawing.

If a system is under test and there are no defects, which is proved by the bell at the testing machine remaining stationary, there would be no apparent evidence what kind of test the fixtures were being subjected to.

But suppose there were some defects, the smoke would penetrate through the defect, and would be detected easily, because not only of odor, but also the presence of the smoke would be seen.

This test, whether it be air or smoke, is necessary without doubt, and we are sorry to hear of any plumbing inspector, holding such a responsible position, yet not knowing why a smoke test is essential.

When Smoke Test Can be Dispensed With

There are, however, certain cases when a smoke test is not necessary (see Fig. 2). This is part of a sanitary installation where only lavatories and urinals are fitted up.

The piping and traps are all installed, each trap is capped, and a small air vent placed on each cap to let the air out.

It will be seen that no joints have to be made on the sewer side of the traps, and a water test would be a much more severe test. In such a case, however, all the traps would have to be examined and the seal proved by measurement, and it might be well to state here that up to 3-inch traps all traps should have a seal the same depth as its diameter. Fig. 4 shows the true definition of the seal of a trap.

In conclusion, The Sanitary Engineer fully endorses what is popularly known as the smoke test. Such tests to be made after all fixtures are installed, and before the fixtures have been fitted to any soil, drain or vent pipe, such piping must have been subjected to either a water test or an air pressure test of not less than 10 pounds.

A smoke test, however, would not, in our opinion, be sufficiently rigid if that were to be the only test to be made.

Figs. 1 and 2 appear on page 48.

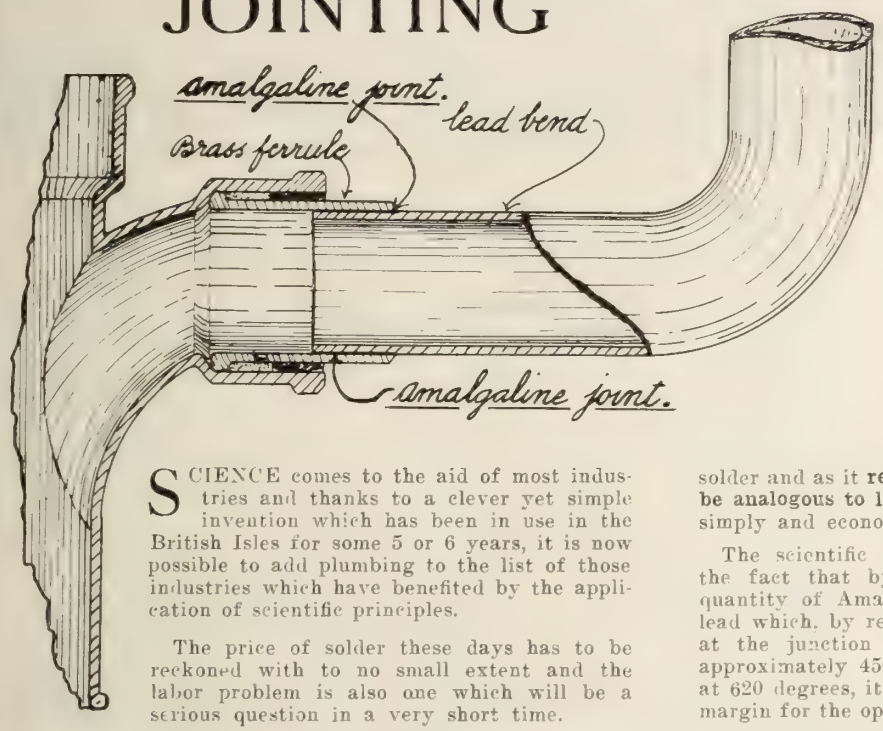
FURNACE TROUBLE

Editor Sanitary Engineer:

I have lately installed an ordinary household furnace. It appears to be quite satisfactory except in one particular. When the furnace door is first opened, a few minutes after making up the fire, there is a rush of blue flame from the fire to the outside. This is sometimes so violent that if not careful anyone opening the door might be scorched, and the flames have already scorched the wooden beams in the roof

(Continued on page 48)

A SCIENTIFIC METHOD OF LEAD JOINTING



Describing the many advantages of using AMALGALINE as compared with solder and lead burning.

The wiped joint belongs to the past. It cannot claim the right to its existence at this scientific age. It is too costly in time and material and is unsightly.

The wiped joint has practically driven lead out of existence in the plumbing trade.

SCIENCE comes to the aid of most industries and thanks to a clever yet simple invention which has been in use in the British Isles for some 5 or 6 years, it is now possible to add plumbing to the list of those industries which have benefited by the application of scientific principles.

The price of solder these days has to be reckoned with to no small extent and the labor problem is also one which will be a serious question in a very short time.

But with the introduction of **Amalgaline** Jointing on all lead work, both these questions can be eliminated to a considerable degree.

There never was any authority yet who ever attempted to claim that iron pipe was superior to lead for water or waste pipes, and the introduction of iron pipe was to no small degree brought about by the objectionable wiped joint, which by the way is not actually a joint. Now, the question is that new methods must take the place of old methods in all lines, and as **Amalgaline** has proved itself to be far superior to the wiped soldered joint, there is but one other matter to consider, that of cost.

Amalgaline Joints can be made at nearly one-third the cost of wiped joints, and are more scientific.

Amalgaline Joints require more skill if anything than wiped joints, though not half the time is required to make one, and further any or all joints made for chemical works or electroplating industry need not be made by lead burning.

Amalagaline is acid proof and has been tested and tried, and has accomplished all and more than lead burning will stand.

It would now be well to describe briefly what Amalgaline is; then by showing how it is applied and what results it effects, we shall see that it escapes the drawbacks of solder jointing and that in its universal adoption lies the salvation of the plumbing trade in so far as jointing is concerned.

First, Amagaline is an absolutely pure metal treated with a patent composition which acts as a flux to prevent the formation of oxides. In its manufactured form it is sold in continuous lengths, 1½" wide and one five-hundredth of an inch thick. When placed between two surfaces of lead and subjected to heat, the action is such as to cause the surfaces of the lead with which it is in contact to fuse at a lower temperature than the normal melting point. Therefore it will be quite evident that it is in no sense a solder and as it **resists the effects of acids it may be said to be analogous to lead burning**, but it is applied much more simply and economically than the latter process.

The scientific importance of the invention consists in the fact that by intermolecular absorption the minute quantity of Amalgaline is dissipated in the body of the lead which, by reason of the absorption, becomes stronger at the junction than elsewhere. The fusing point is approximately 450 degrees Fahr., and taking that of lead at 620 degrees, it will be realized that there is a very safe margin for the operator without risk of melting the lead.

With all mechanical operations, much depends upon the operator, the more skilled the mechanic the better the result of the work, and so it is with Amalgaline. Unless the work is properly prepared and truly fitted a sound joint cannot be made, and in this respect it differs from the "wiped" joint which, as we have already said, by the application of a mass of metal to the outside of the pipes puts out of sight the essential part of the work, viz., the preparation. Again the close fitting surfaces that Amalgaline jointing requires prevent any metal running through and consequently there is ensured an absolutely clean bore to every pipe; thus it can be claimed to be the most hygienic form of jointing known.

Although a "wiped" joint may be a skilled operation it does not bring about a scientific result. This cannot be contradicted because no one who has made a study of metals will suggest that it is correct to connect up a soft and pliable metal like lead with a hard and brittle substance like solder; it is obvious that under a strain the harder metal must tear away from the softer. By using the Amalgaline system, the use of an alloy is entirely eliminated and from a metallurgical point of view a true scientific result is produced, viz. a fused, or autogenous joint.

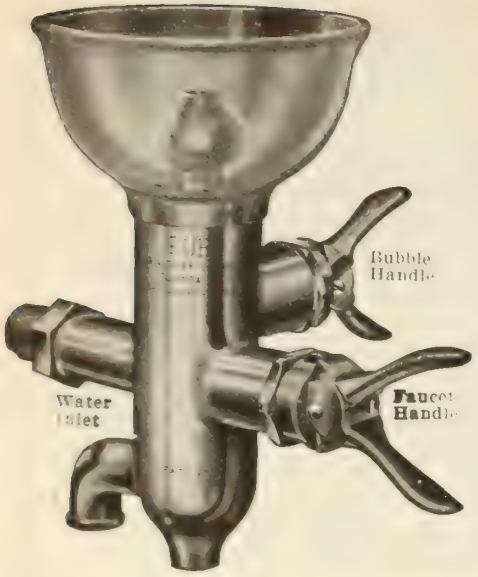
Having thus briefly described the advantages which are claimed for the Amalgaline method of jointing, it may be as well at this point to state that they have been fully substantiated as a result of nearly six years' practical experience of the system in the United Kingdom. If evidence is required it is to be found in its general use in all branches of plumbing work, and although, as may be imagined, plumbers in the early stages approached it with some diffidence, everything points to the fact that it is now gradually superseding solder jointing. Leading authorities, such as Engineers, Architects and others, have welcomed it as a real advance in plumbing and sanitation, which helps them to bring such important work into conformity with other modern improvements in building construction. Government Departments, Municipal and Public Bodies, Railway Estate Companies, users of Chemicals, Electrical Light and Gas Undertakings, are amongst those who have adopted it, and it is interesting to learn that Amalgaline jointing has been installed in important public buildings such as Windsor Castle, Hampton Court Palace; Municipal Buildings, such as Schools, Asylums and Hospitals; in all new Police Stations erected in the Metropolitan (London) Police area during the past two years. In face of such facts it must be conceded that the need for, and the superiority of, Amalgaline Plumbing has been established beyond doubt.

SOLD IN 50-FOOT REELS. **WRITE US FOR PRICES.**

AMALGALINE COMPANY OF CANADA

186 MANNING AVENUE, TORONTO

Phone—College 3114



Saving or Wasting?

The manner in which you handle the drinking water problem in your plant may seem to be a small matter to you—but investigate. The results will be surprising.

The old-time faucet is costly. Running hour after hour, day after day, its ceaseless flow is costing you money, yet without any better service.

Puro Saves 35%

A Puro Sanitary Drinking Fountain will cut that water bill 35%. We can prove that it has done that for others. It will give every employee a safer, saner draught of bubbling water free from the contamination of the common drinking cup.

In a word, it is the only sanitary Drinking Fountain that is really safe, sanitary, simple, automatic in control, and built to stand.

"PURO-FY"

(MADE IN CANADA)

YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company
147 University Ave., Toronto, Canada

QUESTION BOX

(Continued from page 46.)

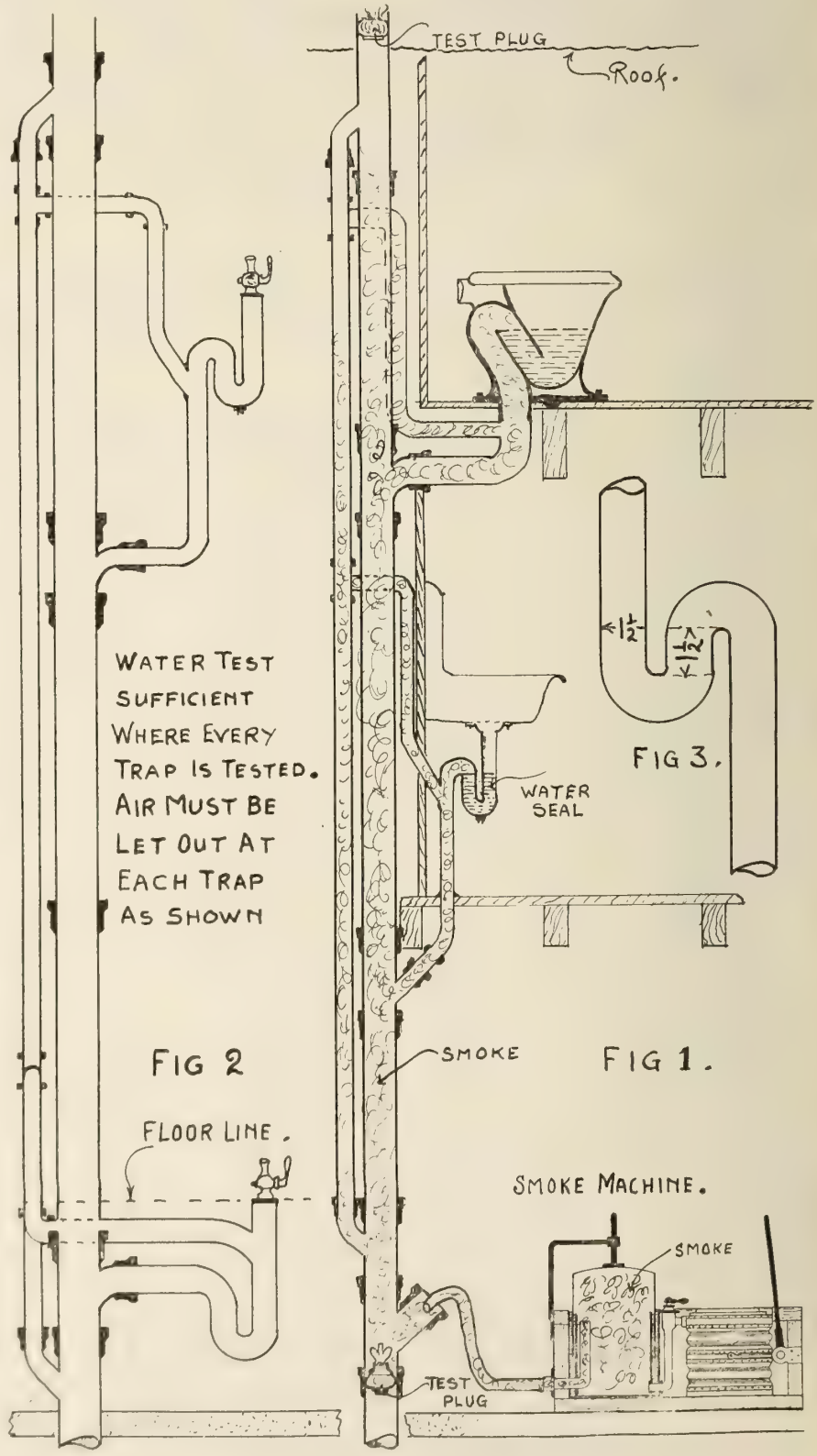
of the basement. Can you inform me what is wrong, or how I can stop this? It only occurs the first time the furnace [illegible] after making up the fire.

EX APPRENTICE.

This is quite a common occurrence if the draught arrangement of the furnace is not quite perfect. When the coal is first put on the fire certain gases are generated which will not burn by themselves but require a certain amount of air to ensure combustion. As a rule, failing the necessary air, these gases are carried away up the chimney and the heat which would be obtained from their combustion is lost. If, however, the draught of the furnace does not carry them away they accumulate at the top of the fire pot and immediately air is admitted they ignite and produce the flames you speak of. You will probably avoid the trouble if you see that the small circular ventilator in the door of the furnace is kept open, this will admit sufficient air to allow the gases to burn away gradually and the heat they produce will be utilized. If this is not effective you will find there is something wrong with the chimney.

ACQUIRED NEW WAREHOUSE

The International Malleable Iron and Fittings Co., Ltd., Guelph, Ont., have acquired a new warehouse. All fittings are stocked and shipped from the new premises. No change of address, however, has been made.



Quick Hot Water at a Big Saving of Gas

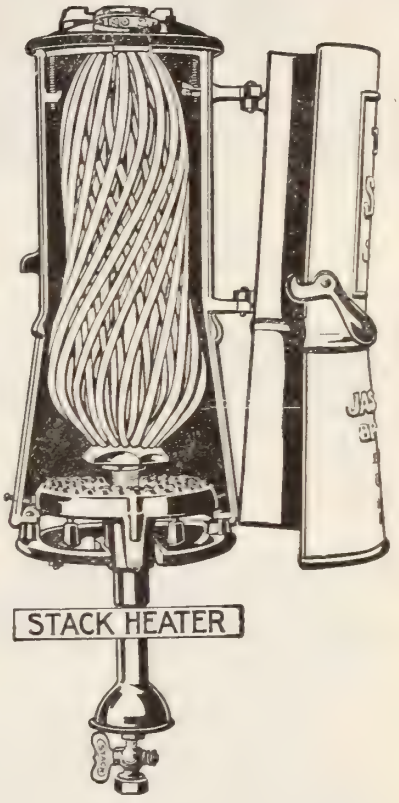
ONE MINUTE AFTER THE

Stack Gas Water Heater

IS LIT IT GIVES HOT WATER AT THE TAP

This is actually the most durable and long-lived Copper Coil Gas Water Heater made—it is the easiest and quickest to instal.

Costs but little more than the ordinary heater, but the extra cost is quickly covered by the savings effected.

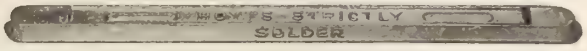


EASILY SOLD BIG PROFIT

James Morrison Brass Mfg. Co., Ltd.

93-97 ADELAIDE STREET WEST, TORONTO

Our Mixed Metal Sales Amount to Over $5,000,000 Annually



We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

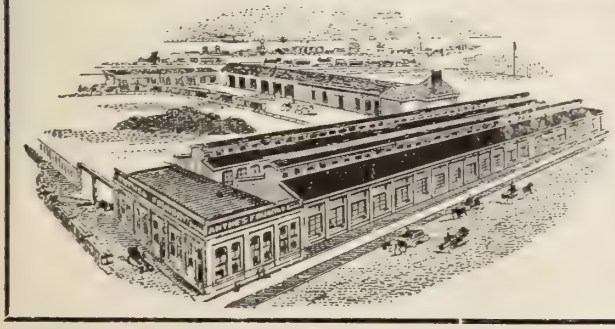
Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO

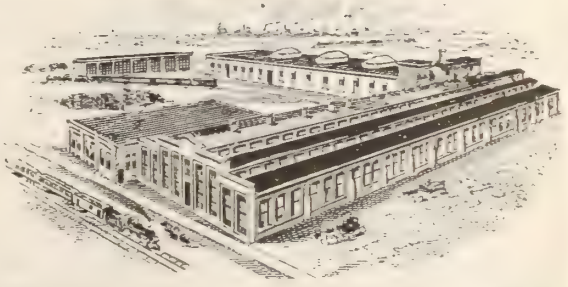
New York, N. Y.; London, Eng.; St. Louis, Mo.

TORONTO **ANTHES FOUNDRY LIMITED** WINNIPEG

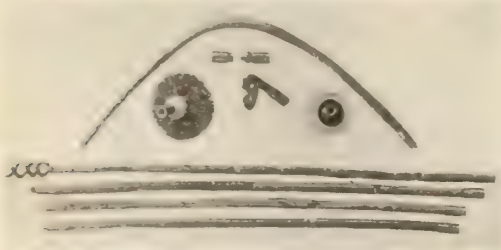


MANUFACTURERS OF

CAST IRON SOIL PIPE AND FITTINGS



DRAIN CLEANING MACHINE
As supplied to His Majesty's Government.



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The Hotstream HEATS IN A HURRY TRADE MARK REG. WATER HEATER

The most complete line of high-grade tank heaters made in America. Capacity from 30 to 200 gallons.

Write for catalogue and calendar.

The Hotstream Heater Co. - Cleveland, Ohio

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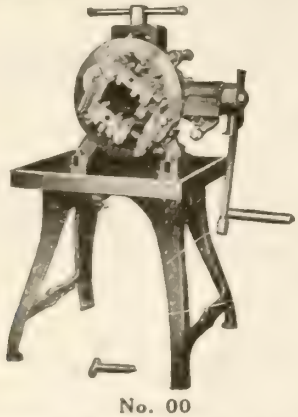
FOR SALE

PLUMBING, HEATING AND TINSMITHING business for sale in a growing town, Lincoln County, Ontario. Reply to Box 100, Sanitary Engineer. (6)



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PIPE MACHINES

Either Hand or Power

This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
A time and labor saving machine.

Manufactured by

THE ARMSTRONG MFG. CO.
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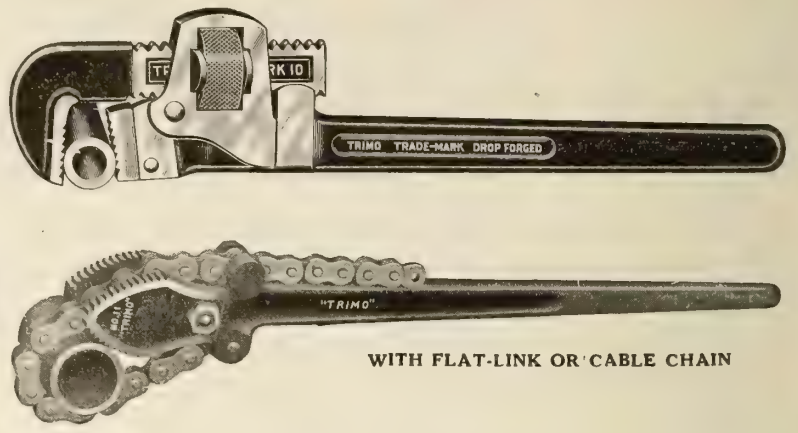
World-Famed Specimens of the Age of Steel

TRIMO



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WITH FLAT-LINK OR CABLE CHAIN

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TRIMONT MFG. CO., 55 Amory Street, Roxbury, Mass., U.S.A.

Consulting Sanitary Engineer

Advice and Plans on Water Supply and Sewage Disposal for Residences, Factories, etc.

H. L. SEYMOUR, B.A.Sc., A.M. Can. Soc. C.E. Box 95 Sanitary Engineer TORONTO - ONTARIO

THE TINSMITH'S HELPER AND PATTERN BOOK

By H. K. Vosburgh — Revised by William Neubecker

This is a book of 135 pages, 54 plates. Epitome of mensuration. Mensuration of surfaces.

Tables, Rules and Recipes. Practical Receipts, on the making of all kinds of solder.

The Most Practical "Helper" Ever Introduced Into The Tinshop.

PRICE $1.00, Postage Prepaid.

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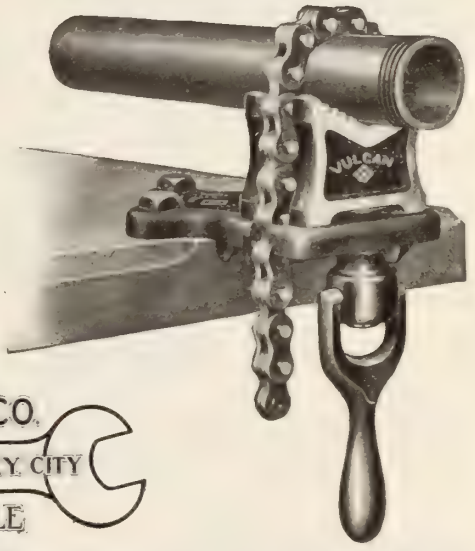
BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED
Montreal Works: Lachine Canal

They are powerful, but not destructive. Unbreakable, broadly adjustable, universally attachable.



J. H. WILLIAMS & CO.
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THE WRENCH PEOPLE

Talking to the Point—

CLASSIFIED ADS. get right down to the point at issue. If you want something, say so in a few well-chosen words. Readers like that sort of straight-from-the-shoulder-talk, and that is the reason why condensed ads. are so productive of the best kind of results.

CLASSIFIED ADS. are always noticed. They are read by wide-awake, intelligent dealers, who are on the lookout for favorable opportunities to fill their requirements.

TRY A CONDENSED AD. IN THIS PAPER.

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500 Questions and Answers on Steam, Hot Water and Vapor Heating

By A. G. KING

A Book which every heating engineer should possess. Contains over 200 pages, is full of illustrations, some of which are entirely new, simply written, and complete.

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The Theory and Laws of Heat.
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Tables, Rules, etc.

Price $1.50, Postage Prepaid

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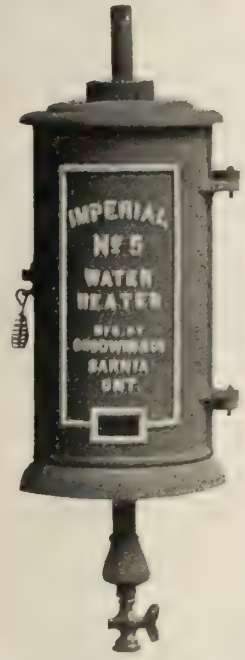
THE MACLEAN PUBLISHING COMPANY, LIMITED

143-153 University Avenue, TORONTO

HOT WATER IN A JIFFY

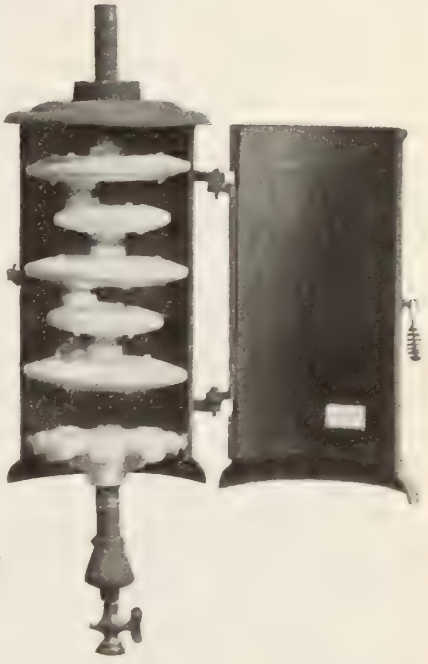
The New "Imperial" Gas Water Heater



The coils are arranged so that the water has complete circulation. No dead heads to lime up. The water must pass through each and every section, thus ensuring scalding water in a few seconds.

The new "Imperial" is a sure friend-maker and business-getter everywhere, and it gives a good profit.

Write for prices and full particulars.



Goodwin & Company
SARNIA, CANADA

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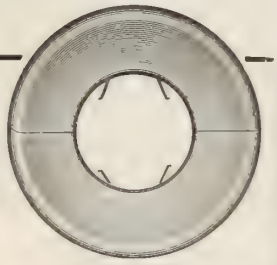
The CEILING PLATE that's better



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The split ceiling plate is coming more and more into use than ever and ALWAYS GIVES A NICE FINISH, because it can be attached to mains and risers at the very last, and is not exposed during completion of a building on the floors.

High quality at the right price.

Gem No. 4.

Gem No. 4 Automatic Air Valve

Made from the best brass obtainable. Pressed shell and pressed brass base which eliminate danger from blowholes, which is a fault with cast bases.

Write for catalog showing our complete line of specialties.

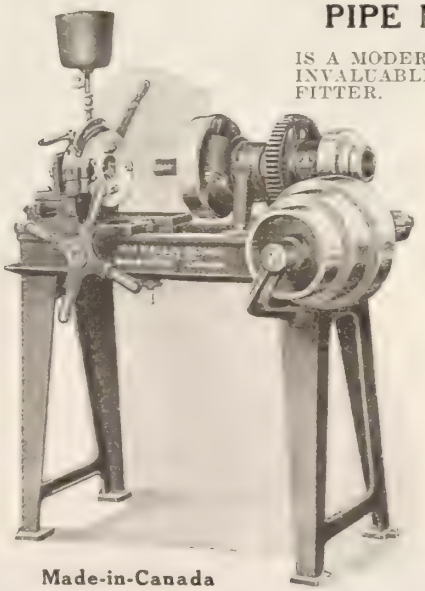
The BEATON & CADWELL MANUFACTURING Co.
New Britain, Conn.

Eastern Agent: J. R. Devereux & Co., 233 St. James Street, Montreal. Western Agent: A. E. Hinds & Co., Chamber of Commerce, Winnipeg.

Save TIME and PIPE and CUT TRUE THREADS

THE HALL NO. 2 PIPE MACHINE

IS A MODERN TOOL THAT IS INVALUABLE TO THE PIPE FITTER.



Made-in-Canada

Built in Canada for a maximum amount of accurate and efficient service to Canadians, and they cost less than imported machines.

Capacity, ¼-in. to 2-in. pipe. Nipples, ¼-in. to 2-in. Bolts, ⅜-in. to 1½-in. Hand, Belt or Motor drive.

Only one of the many sizes manufactured by us.

Ask the user about Hall machines — we'll gladly furnish you with names.

Prompt delivery from stock.

JOHN H. HALL & SONS, Limited
BRANTFORD, CANADA

Classified Buyers Guide

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Air Line Systems.
C. A. Dunham Co., Ltd., Toronto.

Air Valves.
Canadian Wolverine Co., Ltd., Chatham.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
C. A. Dunham Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
Jenkins Bros., Ltd., Montreal.
Kerr Engine Co., Ltd., Walkerville.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Asbestos Goods.
James Morrison Brass Mfg. Co., Toronto.

Boilers, Steam or Hot Water.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Boiler Feed Regulators.
C. A. Dunham Co., Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Brass Goods, Valves, etc.
Canadian Wolverine Co., Ltd., Chatham.
C. A. Dunham Co., Ltd., Toronto.
Jenkins Bros., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Brass Pipe and Tube.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Bubblers.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.

Cellar Drainers.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Penberthy Injector Co., Ltd., Windsor, Ont.

Chain Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Closets.
Amherst Foundry Co., Amherst, N.S.
B. O. T. Manufacturing Co., Toronto.
Cluff Mfg. Co., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Consulting Engineers.
H. L. Seymour
R. O. Wynne-Roberts, Toronto.

Country Residence Equipments.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Limited, Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Damper Regulators.
C. A. Dunham Co., Ltd., Toronto.

Drainage Fittings.
[illegible] & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.
[illegible]

Drinking Fountains.
Puro Sanitary Drinking Fountain Co., 143 Univer[illegible]

Ejectors, Steam.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville.

Ejectors for Sewage
National Equipment Co., Ltd., Toronto.

Enamelware.
Amherst Foundry Co., Amherst, N.S.
[illegible]
James Morrison Brass Mfg. Co., Toronto.
[illegible]
Standard Ideal Mfg. Co., Ltd., Port Hope.

Electric Pumping Machinery.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Faucets.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.

Fittings.
International Malleable Iron Co., Guelph.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Flushometers.
Canadian Wolverine Co., Ltd., Chatham.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Floor and Ceiling Plates.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
Canadian Wolverine Co., Ltd., Chatham.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
James Morrison Brass Mfg. Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Gasoline Engines.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Gas Water Heaters.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Generators.
W. E. Clark & Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.

Heaters.
Harris Construction Co., Ltd., Montreal.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Lead.
Hoyt Metal Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Mixing Valves.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Co., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Monkey Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Nipples.
Canadian Wolverine Co., Ltd., Chatham.
Canadian Tube & Iron Co., Ltd., Montreal.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.
Warden King, Ltd., Montreal.

Oil Storage Systems.
National Equipment Co., Ltd., Toronto.

Packing.
Canadian Wolverine Co., Ltd., Chatham.

Pipe and Radiator Hangers.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.

Pipe, Black and Galvanized.
Canadian Tube & Iron Co., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Warden King, Ltd., Montreal.

Pipe Cutters.
Trimont Mfg. Co., Roxbury, Mass.

Pipe Joint Compounds.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

Pipe, Soil, and Fittings.
Anthes Foundry Co., Toronto and Winnipeg.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Warden King, Ltd., Montreal.

Pipe Threading Tools and Machinery.
Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.
A. B. Jardine & Co., Hespeler.

Pipe Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Porcelain Ware.
Amherst Foundry Co., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Pumps.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Cluff Bros., Church St., Toronto.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Radiators.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.

Radiator Traps (Steam).
W. E. Clark & Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.

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C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

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Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
West Toronto Foundry Co., West Toronto.

Solder.
Hoyt Metal Co., Toronto.

Steam Specialties.
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Dart Union Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
Eddy Engineering Co., Alpena, Mich.
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James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville, Ont.

Steam Traps.
Canadian Morehead Co., Ltd., Woodstock.
C. A. Dunham Co., Ltd., Toronto.
Harris Construction Co., Ltd., Montreal.

Smoke Test Machines.
James Morrison Brass Mfg. Co., Toronto.

Tanks, Steel and Wood
Ontario Wind Engine & Pump Co., Toronto.

Testing Plugs.
James Morrison Brass Mfg. Co., Toronto.

Tools.
Armstrong Mfg. Co., Bridgeport, Conn.
Canadian Wolverine Co., Ltd., Chatham.
Hall & Sons, Ltd., Brantford.
James Morrison Brass Mfg. Co., Toronto.
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Nicholson File Co., Port Hope, Ont.
Williams, J. H., & Co., Brooklyn, N.Y.

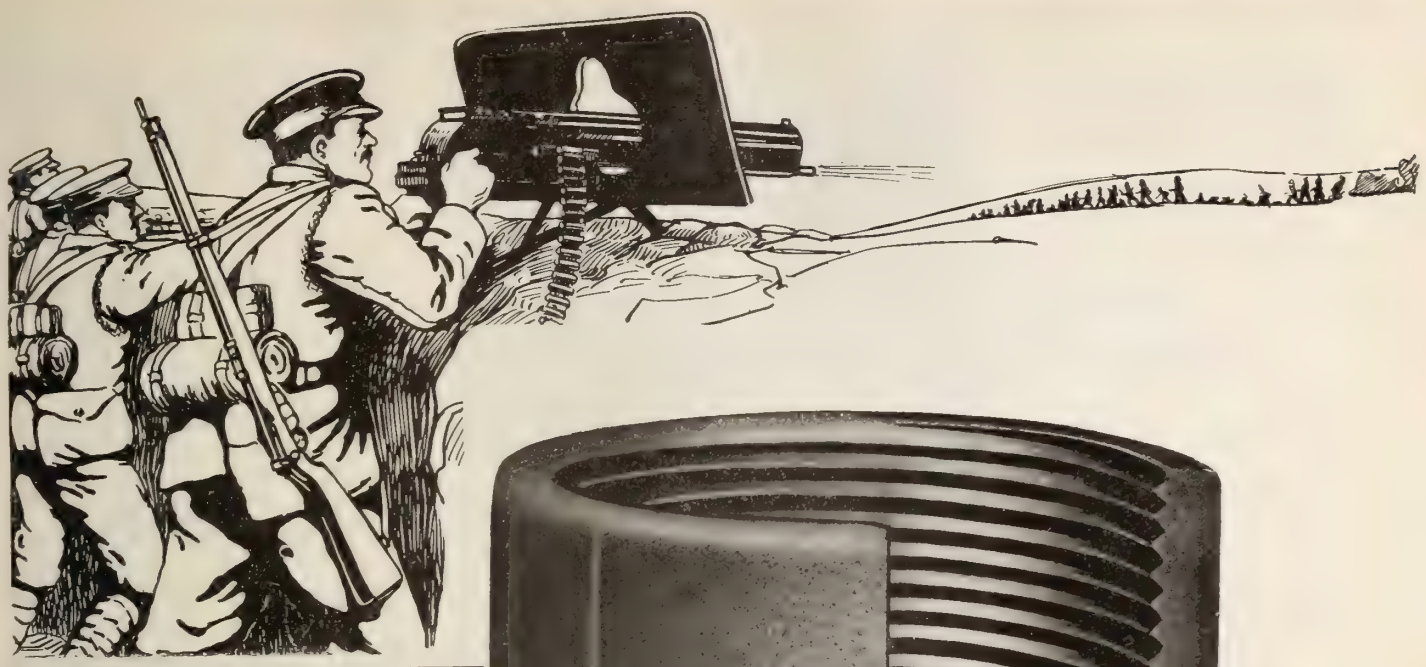
Unions.
Dart Union Co., Ltd., Toronto.

Vapor Heating Systems.
C. A. Dunham Co., Ltd., Toronto.
W. E. Clark & Co., Ltd., Toronto.

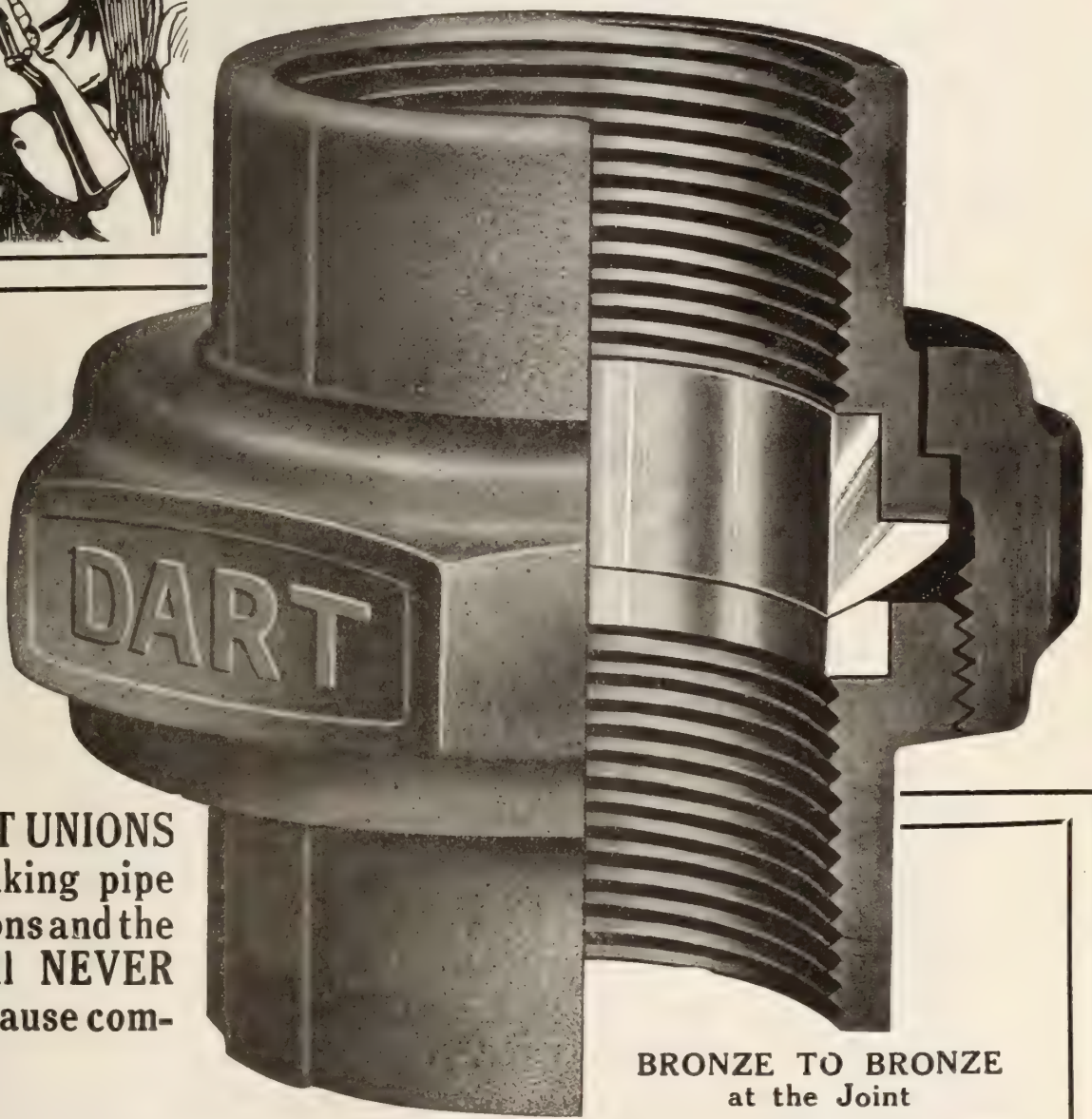
Vitro Tanks
Cluff Mfg. Co., Toronto.

Vacuum Systems of Heating.
C. A. Dunham Co., Ltd., Toronto.

Water Supply Systems.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.



The Lines that hold

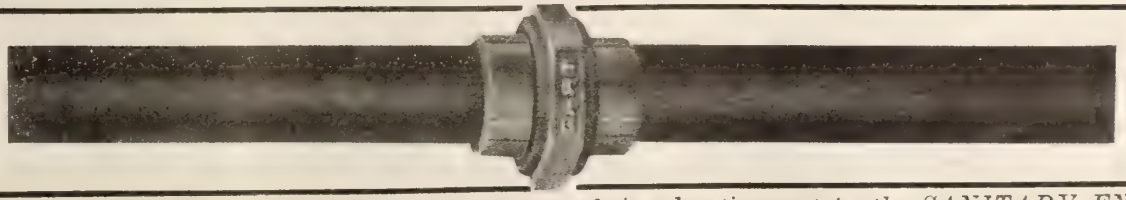


Use DART UNIONS when making pipe connections and the joint will NEVER leak or cause complaints.

BRONZE TO BRONZE
at the Joint

They make a sure joint every time—they make one that is permanently tight because the bronze faces cannot deteriorate, and the heavy iron parts withstand all stress and strain.
The ball-shaped joint makes connecting easy, whether pipes are in or out of alignment.
Dart Unions are made in a variety of styles to fill all requirements, and in a number of time-saving combinations, such as **UNION ELBOWS, TEE UNIONS,** etc., etc. **Order from your jobber.**

DART UNION CO., LIMITED, TORONTO, ONT., CANADA

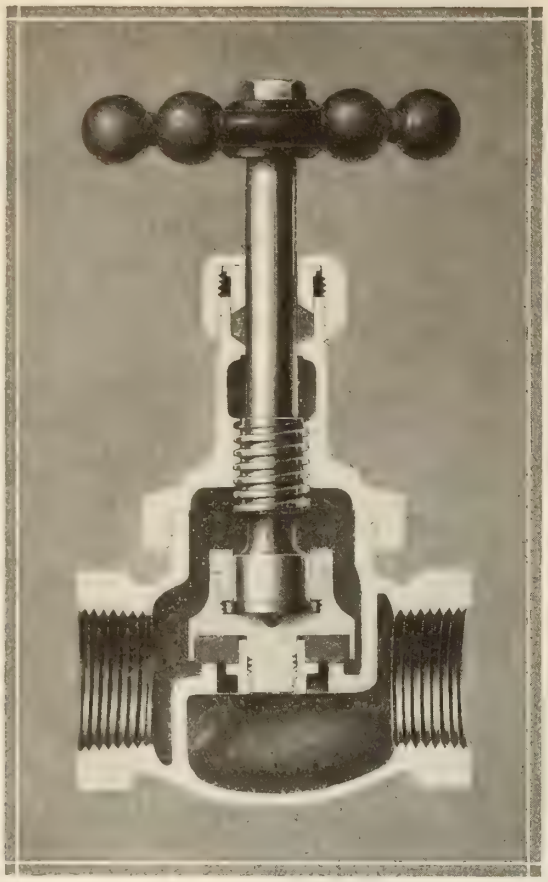


PENBERTHY

Look carefully at method of fastening bonnet to body of valve.

GET THE IDEA?

COMPODISK



PENBERTHY

The bonnet screws on OUTSIDE

This is the way you always thought it should be, isn't it.

COMPODISK

This is the name of the valve that has the outside bonnet construction.

→ COMPODISK ←

The finest valve ever put on the market.

Registered and approved by Public Works Departments in the Provinces for 175 lbs. Steam Pressure.

Made in Globe, Angle, Horizontal and Swing Styles.

PLUMBERS AND STEAMFITTERS

When you get a contract or repair job to do, figure on putting in COMPODISK Valves. These cost no more than other valves not in the same class and they will give the service.

Remember, the Bonnet Screws on Outside

THREADS IMMUNE FROM CORROSION

Makes valve easy to take apart. No straining or stripping of threads — No spreading of bonnet end of valve, causing a loose-fitting and unsafe bonnet.

Stocked by Leading Jobbers Everywhere.

MANUFACTURED BY

Penberthy Injector Co., Limited

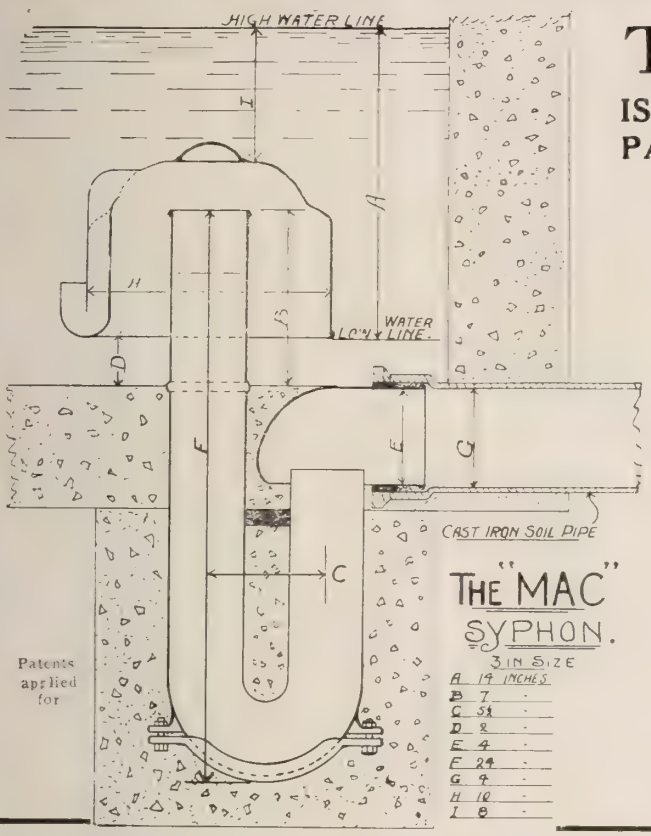
WINDSOR, ONTARIO

We also make full line of Regrinding Valves.

THE DISCS
Won't Flake
Won't Chip
Won't Crack

They are interchangeable with other standard makes on the market.

Do You Install Septic Tanks?



The "MAC" Syphon

IS POSITIVE IN ACTION, HAS NO MOVING PARTS, IS FULLY GUARANTEED AND IS

Made In Canada

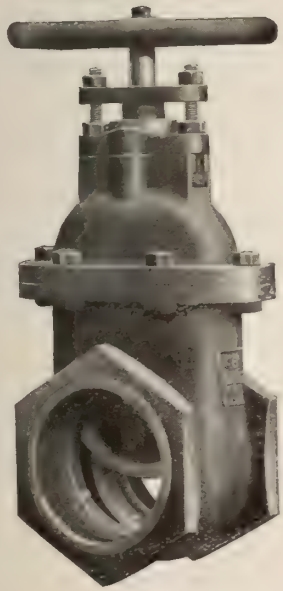
Write us for full particulars about this syphon. We are expert foundrymen and can turn out the goods at the lowest possible cost.

We also manufacture a full line of cast iron soil pipe fittings.

Drop us a line. Our prices will surprise you.

West Toronto Foundry
West Toronto, Canada

KERR GATE VALVES



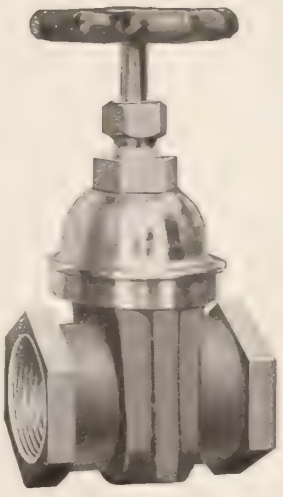
I. B. GATE

These Iron Body Gate Valves were designed and are made by US to meet YOUR demand for strong, substantial, interchangeable valves, with "nobby" appearance.

They meet the requirement and more. When they get us a customer they hold him.

Who in the Steamfitting trade has not heard of and used Kerr's (Weber) Brass Gate Valves? We say "Kerr's"—not the imitations. We make this valve of uniform material, and they stand up to the work given them, just as they always have. Some have tried others, but they came back to the tried and trusty old "Weber Gate" made by Kerr. What is a few cents on a valve, when you can get one like the genuine "Weber"?

Have you our Catalogue No. 5?
If not, we will mail you one.
A postal to-day will bring it.

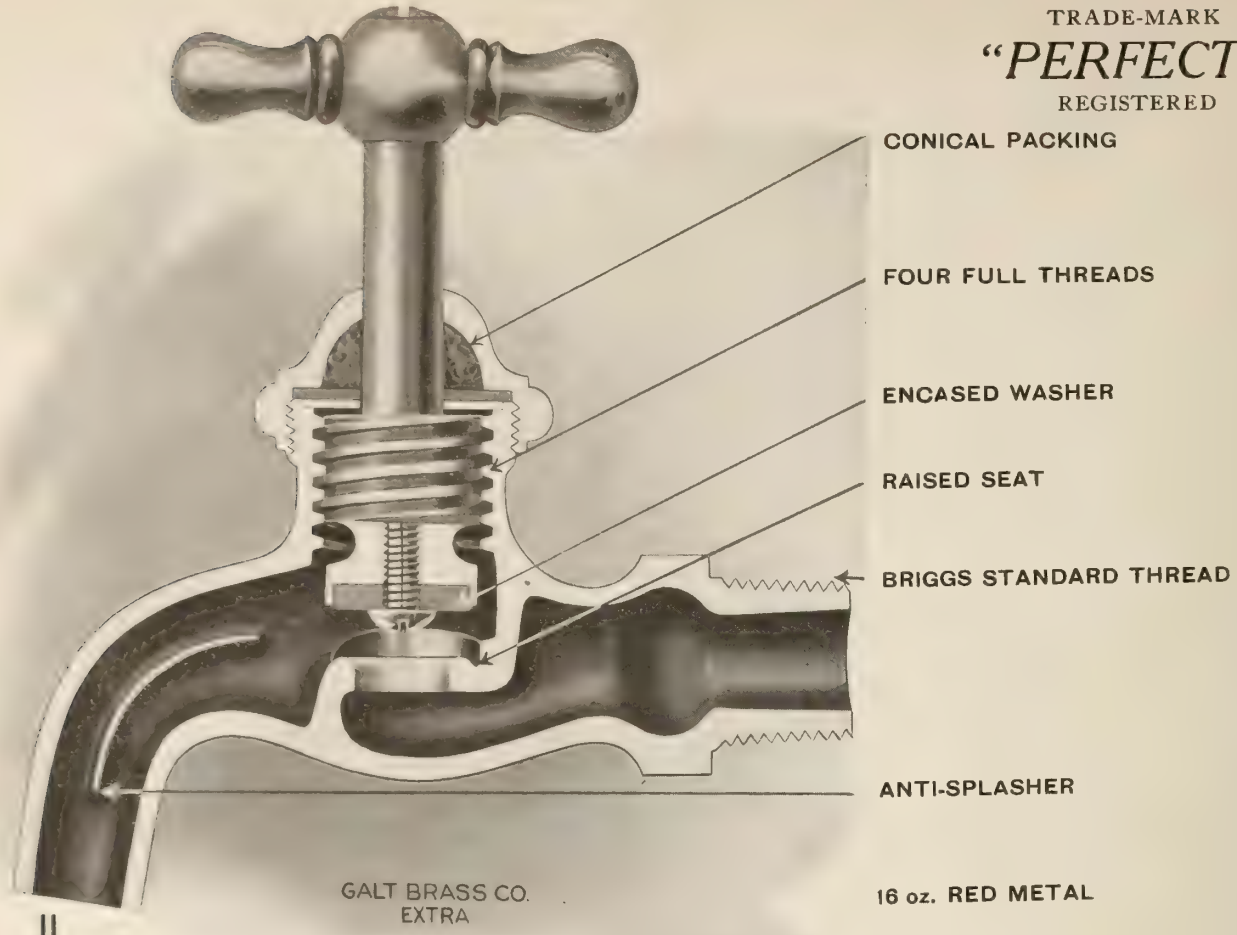


BRASS GATE

THE KERR ENGINE COMPANY, LIMITED

WALKERVILLE, ONTARIO

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

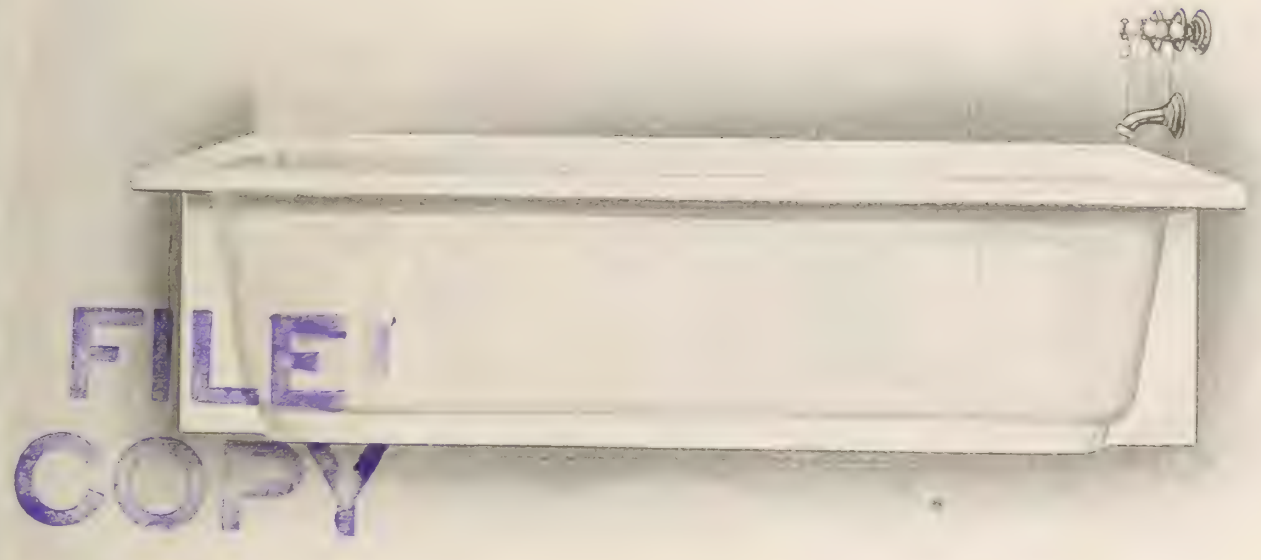
Vol X. Publication Office: TORONTO, APRIL 15, 1916 No. 8

Enameled All-over

VICTOR ONE-PIECE BATH

Enameled Inside

FILE COPY



FILE COPY

The principle of the Victor Bath is a tub body cast integral with a Base and Wing Plates: the latter in various positions on the Tub Body to make the various Combinations, viz.:

Open Type
Corner Type
Recess Type
End to Wall Type
Back to Wall Type
Also with Extension Rim at End or Back for fittings—thru rim.

PRICES ON REQUEST

The Standard Ideal Company Limited

General Offices and Factories: Port Hope, Canada

TORONTO	MONTREAL	WINNIPEG	VANCOUVER
119 King St. East	42 Beaver Hall Hill	76-82 Lombard St.	203 Crown Building

THE LARGEST EXCLUSIVE CAST IRON ENAMELING SANITARY WORKS UNDER THE BRITISH FLAG.

Beaver Brand
Cast Iron Enameled Ware

The pedestal lavatory has come to stay. It is now the most attractive fixture in a bathroom and is reasonable in price.

Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability

Ask your jobber for BEAVER BRAND CAST IRON ENAMEL WARE and build up your reputation

EVERY DOLLAR WE OWN STANDS BEHIND THE GOODS WE MAKE

Amherst Foundry Co., Limited

General Offices and Factory: Amherst, Nova Scotia

AGENCIES:

ONTARIO:
Monarch Brass Mfg. Co., 71 Brown St., Toronto

MANITOBA and NORTHWEST:
E. B. Plewes, 120 Lombard St., Winnipeg

28 "Service" Branches Throughout Canada.

Canadian Consolidated Rubber Co., Limited

MONTREAL, P.Q.

EFFICIENT SERVICE

Our constant aim is to give you EFFICIENT and RELIABLE SERVICE, the kind that leaves an impression of personal attention.

"Service" Branches throughout Canada, with complete stocks, make quick and prompt deliveries possible.

If It's Rubber
The Dominion Rubber System
Has It

WRITE FOR CATALOGUE, AND LET US SHOW YOU HOW WELL WE CAN SERVE YOU.

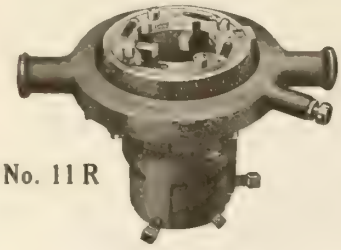
Canadian Consolidated Rubber Co., Limited

MONTREAL, P.Q.

28 "Service" Branches Throughout Canada.

"Jardine" and "Toledo" Pipe-Threading Tools

Reduce the labor of pipe threading 50 per cent. and make threads as clean and perfect as if cut on a Lathe with only ONE cut.



No. 11 R

"Jardine" Adjustable Ratchet-Threading Tool

Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely enclosed, excluding chips and dirt.

"Jardine" or "Toledo" dies spare the muscle of the man who does the work, and save money for the man who pays the wages, as they enable one man to do the work of two and cost less for repairs. No cams or jimcracks to wear and get out of order. Cutters that cut, don't squeeze. Set of cutters for each size of pipe. Lead screw ensures perfect pitch and form of threads. Adjustable to all variations of fittings, very durable cutters.

IS NOT A TOOL LIKE THIS WORTH YOUR CLOSEST INVESTIGATION?

We'll be pleased to put you in touch with users and send catalog. Write!

All threads finished at one cut. One man does the work of two.

MADE IN CANADA

A. B. JARDINE & CO.

HESPELER, ONT.

Sole makers of "Jardine" Pipe-Threading Tools.
Sole licensees to manufacture and sell Toledo Pipe-Threading Tools in Canada.
Agents, Winnipeg and West—Stanley Brock, Ltd., Winnipeg, Man.
Brockville and East:—J. R. Devereux, 233 St. James St., Montreal.

--Good Files Promote Efficiency

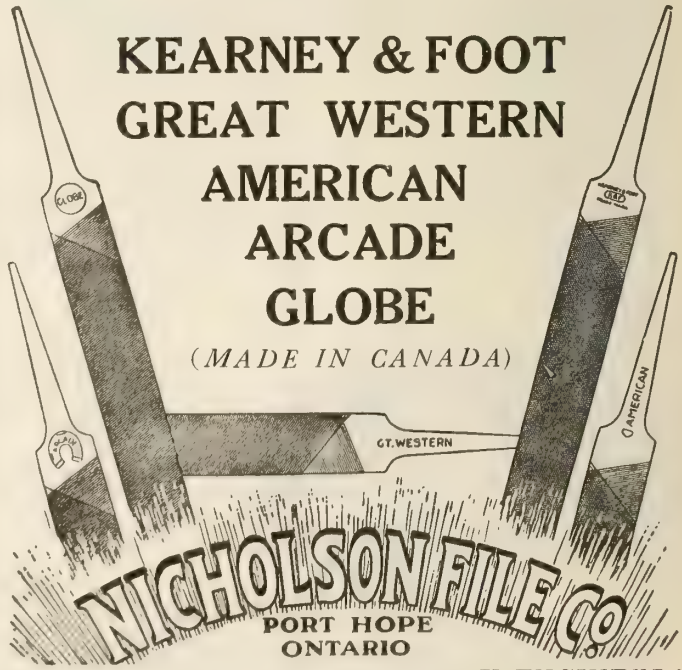
You cannot get away from the fact that when a man is working with a good tool his pride in his work increases. A file worn smooth irritates the most even-tempered workman, while the high-strung, skilled mechanic who works with a bad file for half an hour costs his employer more in wasted mental and physical energy than possibly a dozen files may cost him—in the final results.

Educate your men to throw away their files when they reach their "inefficient point." It is economy. It is efficiency. It promotes good temper at the bench.

The Famous Five Are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

(MADE IN CANADA)



"When writing advertisers please mention that you saw their advertisement in the SANITARY ENGINEER."

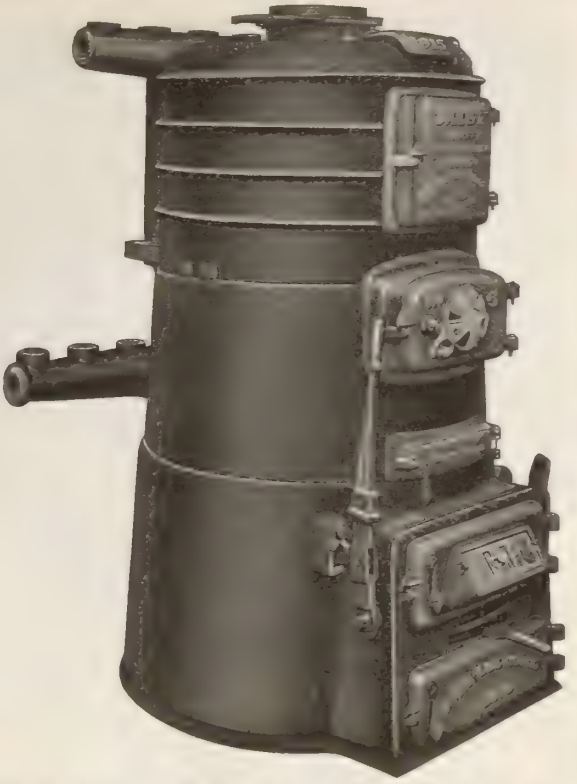
The Daisy Boiler

The Most Popular Boiler Made

Over 60,000 Daisy Boilers are in use throughout Canada—every one giving entire satisfaction. Every installation means a satisfied customer.

Minimum consumption of fuel.

Maximum amount of heat.



WARDEN KING, LIMITED, MONTREAL

City Sales Office: 151 Craig Street West, MONTREAL Branch: 200 Adelaide Street West, TORONTO

Wolverine Tank Balls

—Guaranteed—

The ball with the reinforced top which makes elongation impossible.

Made of the finest rubber and will outwear three ordinary tank balls.

Our full line of Quality Rubber Goods are at your command, and if you want to give satisfaction all the time, use only Wolverine goods.

Canadian Wolverine Company

Limited

CHATHAM, ONT.

Burnham Boilers

The Boiler with a Separate Crown Sheet Section

IT cuts down the lug and tug of set-ups.

It cuts the supply cost way down, in case of accidental breakage of the fire pot.

Here is a boiler with castings so thick you call them thick "without stretching it."

It has a reversible flue travel; so no matter how many, or how few sections used, the smoke hood is always at the rear.

It's by far the best round boiler we have made in our two-score years of boiler making.

It's a friend maker. Another reason why you should make friends with it.

Send for catalog.

Lord & Burnham Co.

Limited, of Canada

TORONTO:	Boiler Dept.	MONTREAL:
Royal Bank Bld.	Factory—St. Catharines	Transportation Bldg.

For Economy and Long Service

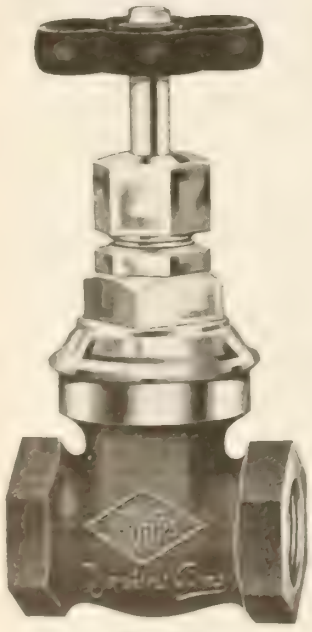


Fig. 360

JENKINS BROS.' Type "K" BRASS GATE VALVES

Standard Pattern **Double-Wedge Type**

On steam, hot and cold water lines, or other places where a full-way is required in order to allow the free passage of thick fluids, these valves will give long, satisfactory service.

They are guaranteed for 125 lbs. working steam pressure and 175 lbs. working water pressure. The metal used in the manufacture of these valves is special, high-grade bronze, steam metal.

All parts are interchangeable.

Write for Catalogue No. 8.

JENKINS BROS., LIMITED

103 ST. REMI STREET MONTREAL

OSBORNE HOUSE, ISLE OF WIGHT
FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

ROYAL PALACE OF LA MAGDALENA
SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN

SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

Standard Sanitary Mfg. Co.
Limited

General Offices and Factory: Royce and Lansdowne Aves., Toronto, Ontario

TORONTO STORE
55-59 Richmond Street, West

HAMILTON STORE
20-28 Jackson Street, West

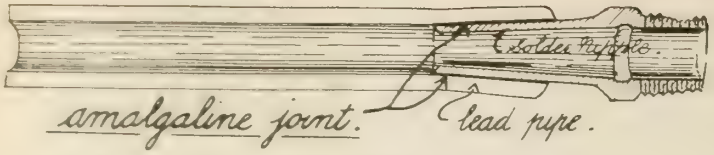
BALMORAL CASTLE
SCOTTISH RESIDENCE OF THE KING AND QUEEN OF ENGLAND

THE QUIRINAL
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ITALY, ROME

BUCKINGHAM PALACE
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ENGLAND LONDON

PALACE OF THE KING OF THE BELGIANS
BRUSSELS

"The Scientific Metal Jointer"



SIMPLE AND SCIENTIFIC

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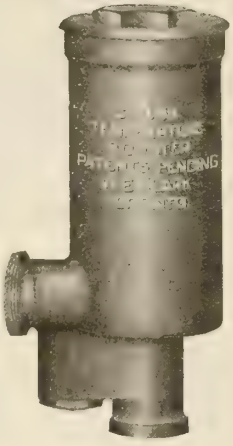

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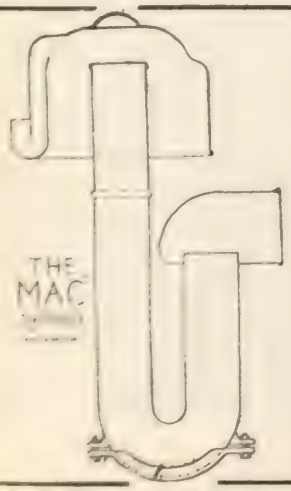

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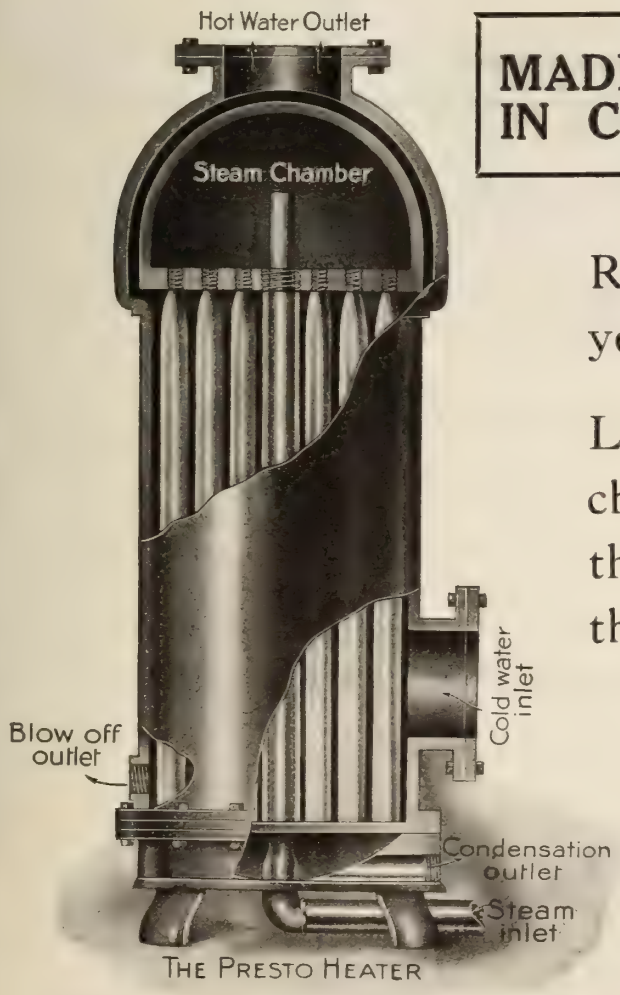

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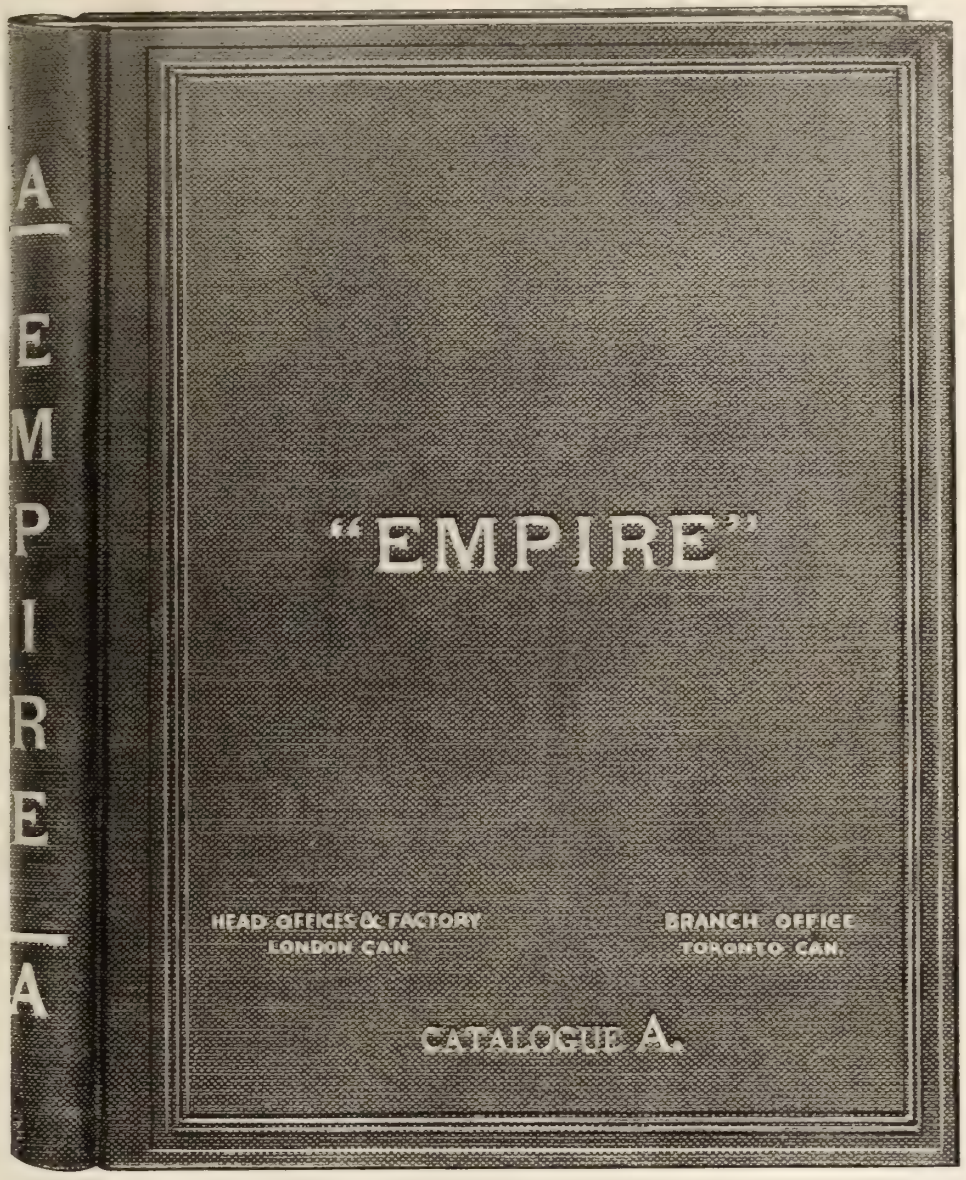

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SANITARY ENGINEER
PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, APRIL 15, 1916 No. 8

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EDITORIAL

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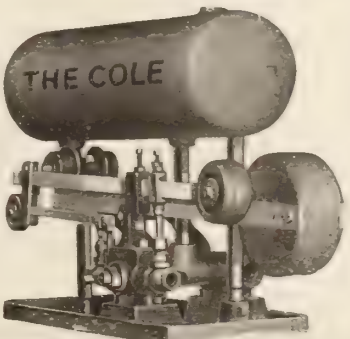

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THE SANITARY ENGINEER

VOL. X. APRIL 15, 1916 No. 8

Conversion of Toronto Globe

Welcome Change in Views of Toronto Daily Newspaper—A Contrast Between Present Ideas and Those of 1909*—Entrust Work to Qualified Workmen Only*

IN our last issue we had occasion to comment upon an article which recently appeared in the Toronto Globe, in which a system of "Every man his own plumber" was advocated, and readers were led to believe that it was quite an easy matter for them to instal a sanitary sewer system on their own account without assistance from any such person as the sanitary engineer. To anyone acquainted with the Globe's previous advocacy of the cause of the "botch" plumber and with its sturdy opposition to the introduction of legislation providing for the execution of plumbing work by qualified workmen only the article referred to caused no surprise. That the system of sewage disposal recommended was contrary to law was a minor detail not calculated to worry any one who would in all seriousness recommend an inexperienced man to instal his own sanitary system.

It is with much satisfaction, however, we note, from another article appearing in the issue of April 8th, that the Globe has apparently abandoned its attitude of indifference as to the capacity or competency of workmen to do work entrusted to them. It is true the work there referred to is paperhanging, not plumbing, but we presume that the Globe would consider the disposal of sewage and the installation of sanitary arrangements of equal importance and as needful of proper execution as the hanging of paper.

In the article in question, the Globe, referring to General Bertram and the shell contracts, says:

> "General Bertram would not let a contract for papering his house under the conditions on which he awarded this vast order. To the middleman, who claimed he had intimate relations with a paperhanger, he would have put the natural question: Is the paperhanger in business, and has he the equipment to do the work?"

We congratulate the Globe on its apparent change of attitude, vis-a-vis the desirability of employing competent workmen. Let us see how great this change is by reference to one or two opinions as expressed by that paper in times past.

During the winter of 1909-10 the question of licensing plumbers in the City of Toronto and of requiring them to pass an examination as to their competency to do plumbing work was brought up and discussed in the local press and elsewhere. This paper (then called **Plumber and Steamfitter)** strongly urged the appointment of an examining board and the institution of the examination test. No little controversy arose at the time over the matter, and the Toronto Globe did its best to defeat the institution of the proposed regulations.

We take the following from a leading editorial, under the heading "The Plumbing, not the Plumber," in the Globe, November 29, 1909:

> "There is a strong plea in The Plumber and Steamfitter in favor of increasing the license fee for master plumbers, and requiring all masters and journeymen to pass examinations. The ground for this plea is the inadequacy of the present inspecting staff and the consequent danger of insanitary or otherwise defective work. This would be seeking a desirable end by an **objectionable and useless means.** By all means let us inspect plumbing, and if the staff is inadequate let it be increased, but **let us leave the plumber alone. If his work is defective in material or workmanship, let us see that he tears it out** and makes it good, and if he breaks any by-law, let us see that he is properly punished. **Further than this it would be not only futile, but highly improper to go. . . .** The proper system is to inspect the plumbing, not the plumber. **His capacity is no one's business but his own."**

We have no desire to resurrect the old arguments for and against the examination of sanitary engineers. The question has now been settled. The "objectionable and useless means" have been employed. The "futile and highly improper" course has been followed and the quietus has been given to the theory that a plumber's "capacity is no one's business but his own." No one, however, can fail to be struck by the immense change for the better in the attiture now taken by the Globe.

In 1909 for a householder to have presumed to question any one whom he proposed to employ to instal sanitary fittings as to his competence or ability to carry out his work would, in the Globe's opinion, have been "meddlesome," "pernicious" and "highly improper." If a plumber, or one who called himself such, were to present himself he was to be at once put to work on the job without question. What matter that he knew nothing whatever about the work, or that he was not even competent to wipe a joint! If his work turned out to be defective, the householder was to "see that he tears it out and makes it good." What about the poor householder in the meantime? How long was the tearing out process to last? We can assure our readers as a positive fact that before the by-law requiring a plumber to prove his competence was instituted the inspector had had to make, on at least one occasion, as many as eleven visits on one job before that job was completed to his satisfaction. Just imagine the feelings of the residents in a house in which the plumber had to do his job over eleven times! Yet this was the method seriously advocated by the Globe. "Don't trouble yourself as to whether the workman is competent or not. That would be impertinent. It is none of your business. Whether the man is a competent man is his own business and no one else's. The inspection is the thing. If the job is not properly done let him tear it out again."

Now on the other hand note the difference: "If you are going to have your house papered you will make careful enquiries as to the standing of the man

you propose to employ, you will satisfy yourself as to his capabilities and make sure that he possesses the necessary equipment to enable him to complete the work satisfactorily."

Such a conversion from the "happy-go-lucky" to the careful method seems almost too good to be true, more especially when it is remembered that only a month ago the Globe was advocating that a farmer or rural resident should instal his own sewage system. However, we presume we must accept as a reliable index of the Globe's way of thinking at the present time its opinions as expressed in this last article and we must believe that our esteemed contemporary has at last seen the error of its ways and has joined the ranks of those who hold prevention to be better than cure, or who believe that if you wish to have a job well done you must yourself see to it that the workman is efficient and knows his business, be he paper-hanger, plumber, or what not. To those ranks none will extend The Globe a more hearty welcome than will "Sanitary Engineer."

Adopt Clean Business Methods

Tendering Too Low a Price and Skimping the Job Not Clean Business—Such Methods Open Up an Avenue for the Mail Order House

WHEN a person and firm has tendered upon a certain job, and when having about half completed the contract he or they find that their price is too low, and that money is going to be lost on the job, it is quite a common thing for that person or firm to begin to look around to see where the job can be skimped.

This is being done all over the country, and is to be lamented.

There is no earthly use resenting the charges that plumbers are this and that kind of robber when such things are being done every day. Within the last few days the writer has come across quite a number of instances where skimping is and has been resorted to, just so as to try and break even upon a tender which, in the first place, was too low.

Now, why not cut out this kind of business? Why not decide this spring to handle nothing but a high grade of goods? If this were done, those who handle the cheaper lines might get the business for a while, but not for long. In almost every paper and magazine can be seen advertisements of mail order houses, which read something like this: "Save 1/3 by buying direct from manufacturers," which, by the way, is not a firm of manufacturers. The advertisement goes on to say: "Instal your own plumbing and heating. Our engineers will draw you plans, etc. Our heating plants are guaranteed to heat your home," and so on. But somewhere there lurks a nigger on the fence.

You are asked to furnish a rough [illegible] the location of your proposed bathroom, and the position you would like the fixtures, etc. Then you are furnished with book of instructions.

Now, what does all this mean? It means two things: First, that those who buy from these mail order houses are [illegible] would be plumber, some handy man; and those men have not only installed poor work, but have also furnished poor material; and instead of improving matters, the mail order house ropes the victim in again.

Just to cite one case. In a fairly prosperous town a certain contract was taken to instal a number of fixtures; the job was nearly completed when it was found that a number of cast iron soil pipe fittings had to be furnished that had not been taken into account.

What happened? To dispense with the use of these fittings the soil pipe was made to terminate into the chimney.

The man who does such work may make money all right, but he has no conscience, or if he has and knows no better, he should not be allowed to put in such a construction. It is only by adopting the very best practices and installing the very best goods that maximum service can be procured.

Reprinted from the Peterborough Examiner.

The illustration accompanying this article depicts what really happens. If on the other hand, good, sound business methods are adopted, good goods installed, and a fair price charged, there remains no loophole for the mail order house or the curbstone plumber and handy man to get in.

Polluted Atmosphere and Why

If Homes and Buildings Require to be Ventilated, so do Drains and Sewers, Thus Keeping the Atmosphere on Our Streets, Avenues and Roads Free From Pollution. Only Way to do This is to Dispense With the Main House Trap, Breather and Tile Pipes Within the Walls of a Building

WE have for years given much thought to the question of sewer gases or sewer air. Now, why are there such gases? Simply because sewers, drains, waste pipes, traps, etc., are not being properly ventilated. For instance, there can be no impure air, or sewer gases, if sewers and drains are properly ventilated. Neither can there be any sewer air or gases, in a home, office or building if all traps are furnished with vent or anti-syphon pipes, where necessary.

But, at the same time this trap and waste pipe venting can and without doubt is being over-done in many towns and cities in Canada as well as in all parts of the world.

What then is the remedy? Simply that the men engaged in installing such work shall know just when and when not such traps require to be vented.

Speaking recently to a medical officer of health regarding this question, the doctor said that while he did not think for one moment that sewer gas could be responsible for a typhoid, diptheria or measles epidemic, he was very much of the opinion that sewer gases were not fit to be inhaled by human beings, and that those inhaling such gases were running great risks of having their vitality run down, thus making them susceptible to any disease going. In this connection it is of interest to recall the opinion of a well-known physician on this subject.

At a recent debate held in Brooklyn, on the subject of whether the present crop of serums, antitoxins and vaccines, really have any prophylactic value, the speaker for the negative challenged the champion of the affirmative to a unique trial of the efficiency of these safeguards as compared with that of sanitary plumbing and right living. "I am willing," declared he, "to enter the next epidemic that occurs in any town, with no other precautionary measures, but that I be given quarters in a house that is supplied with all the features of modern up-to-date plumbing. Provided," he continued, "that my opponent is also willing to live in this town with no other protection against contagion for himself, but that of the anti-toxin, serum, or vaccine, which he believes gives immunity against the disease prevalent." Needless to say the offer was not accepted.

In direct contrast to the amount of publicity given these so-called "pestilence preventive poisons," and to the halo cast around them, it is seldom or never that one hears of any honors being awarded to modern plumbing.

Here we have a medical scientist who is willing to place more faith in modern plumbing and right living than in medicinal remedies. In other words, he is a man who favors prevention in preference to cure. If the atmosphere in the home is to be kept pure, sanitary plumbing as well as proper ventilation must be provided.

The same argument applies with our streets and sewers.

If the sewers are not ventilated, then the atmosphere in our streets must be polluted. Furthermore, if sewers are to be ventilated, the soil pipe stack is the natural ventilator. Such being the case, why do some large cities still adhere to the use of the main house trap and breather, thus preventing the sewers from being ventilated?

Again, the main house trap and the tile pipe within the walls of buildings is just now and has always been the direct cause of thousands of blocked drains. Just at the time of writing one citizen has declared that his drain has been blocked for several days, and the occupants of the house were having to use the sanitary fixtures in the next door house, because the drain digger had so many cases of the kind on hand.

In Toronto alone within the last year or two several hundred drains have been dug up, and lawns cut to pieces, all because of a blocked drain and trap. Toronto, by dispensing with the main house trap and demanding cast iron drains within the walls of all buildings, would save thousands of dollars in repair work over and above the extra cost between cast iron and clay tile. And, besides all this, the sewers would be perfectly ventilated, which would mean that sewer gas would be almost a thing unknown.

From a few we have heard that if no main house trap were installed the air or sewer gas from the terminal on a low building would be very likely to enter into openings, such as windows, doors, etc., belonging to a higher building close by. This is no real objection, simply because of the fact that with the sewers being properly ventilated there would be no dangerous sewer gas in existence. Sewer gas only generates in sewers either not ventilated at all or improperly ventlated. Therefore, the air coming from the soil pipe terminal of a lower building would not be polluted, and consequently not dangerous.

Furthermore, if by any chance some foreign matter or obstruction did get into a house drain, the straight through connection would be more "get-at-able" with rods, canes, etc., thus effecting a saving all along the line.

Whatever good the existence of the main house trap and breather, along with flimsy, broken tile pipes under our buildings can claim, they are responsible at least for the following:

Non-ventilated sewers.

Polluted atmosphere of our streets.

Polluted earth under buildings.

Offensive odors emitted from the breathers, which, on a business street, project under every window or door.

Thousands of dollars of expense by having to dig up blocked pipes.

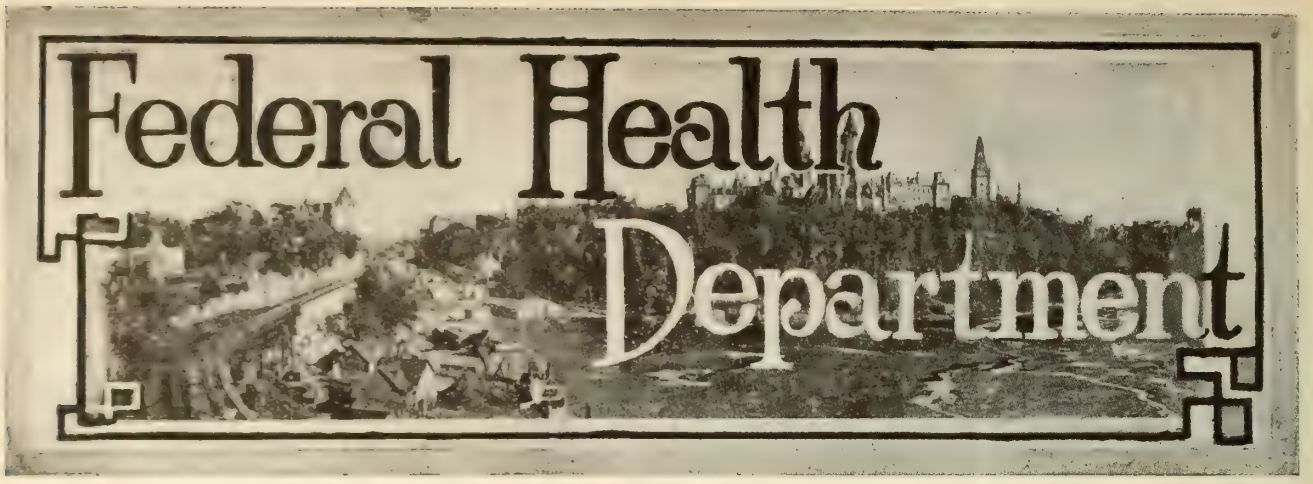
Hundreds of beautiful lawns cut up.

In view of the above facts, it is about time that we had not only purer atmosphere in our sewers, but also on our streets.

Come along, you defenders of the main house trap, breather and tile pipe drains. We want to hear from you; because in Toronto, as well as every other town or city where these abortions exist, we intend dispensing with them unless you can show us why the rest of the world who have already dispensed with them are wrong.

COURTESY A TRADE PULLER

The average woman likes to deal at a store where there is a good stock, and where all the latest and most up-to-date household appliances are on display. Try to extend the utmost attention to every customer, whether she be a purchaser of a ten-cent wire toaster or a high priced case of cutlery. Courteous treatment of women customers is one of the best trade pullers. Price is also a consideration with women customers. They follow prices much more closely than the men. In order to be able to sell right, it is necessary to keep in close touch with the various sources of supply There is a big difference in the prices quoted by various wholesalers and manufacturers on housefurnishing hardware, and by careful attention to buying a merchant can very often pick up excellent selling lines at exceedingly reasonable prices.



(Continued from last issue.)

THE Commission on Industrial Relations, created by the United States Congress to inquire into the causes of the unrest that is shaking the country, have recently made their report. The minority report contains the following:

Each of the thirty odd million wage earners in the United States loses an average of nine days a year through sickness, a money loss of $600,000,000. Great attention is given to accident prevention, yet accidents cause only one-seventh as much destitution as does sickness, and one-fifteenths as much as does unemployment. Unemployment is largely due to sickness, and sickness in time follows unemployment. Thirty to forty per cent. of cases requiring charitable relief are immediately due to sickness. The report advocates a good system of sick insurance, the fund to be created by joint contributions, in this proportion; workers fifty per cent., employers forty per cent., Government ten per cent.

That is the report of an efficient and well organized commission appointed by the Congress of the United States, and I think we can accept its statements as being accurate. I wish to give to the House the opinion of one of the greatest men that the world has produced—Pasteur. The Pasteur Institute in Paris was built as a memorial to the effective work which he had done along scientific lines. At the inauguration of the institute he made use of the following language:

Two opposing laws seem to me now in contest. The one, a law of blood and death [illegible] forces nations to be always ready for the battle. The other is a law of peace, work and health, which only aims to [illegible] from the calamities that beset him. The one seeks violent contests, the other relief of mankind. The one places a single life above all victories, the other sacrifices hundreds of thousands of lives to the ambition of an individual. The law of which we are the [illegible] draws ever enough the harvest [illegible] the wounds due to the law of war. [illegible] Which of these two laws will prevail. God only knows. But of this we may be sure, in obeying the law of humanity, [illegible] life.

Reading those words to-day we could almost imagine them to have been uttered within the last year. Instead of that they were spoken in the year 1888. While the older countries are attempting to find a remedy which at best can be only partial, young Canada should face the problem which in this country is not yet very serious, by taking steps to prevent the cause—disease.

Herbert Spencer says:

To be a good animal is the first requisite to success in life. To be a nation of good animals is the first condition of national prosperity.

So efficiency of the individual and efficiency of the nation are dependent on the physical well-being of our people. For years the industrial system of the world bent its energy to the efficiency of the individual corporation. Then we passed into a period when an attempt was made to increase profits and efficiency by amalgamation of corporations. To-day we are entering upon an era when the corporation, and the industrial and the commercial world, are beginning to realize that efficiency in its truest sense must begin with the conservation of the health and strength of the individual, and they are placing a higher estimate upon the value of the human machine, realizing that a man is greater than a mill, the producer more important than the product, and that what reduces the value of the man will lessen the value of the machinery. Sickness means lessened efficiency of the workmen, lessened efficiency means reduced income, and this is followed by losses in the home and privations to the family.

Dr. Harrington, of Boston, in his book "Prevention of Disease vs Cost of Living," says:

The extent to which health may be conserved and the number of accidents and deaths that can be prevented to-day seems incredible. Testimony of all those qualified to judge agrees that on a very conservative estimate 42.3 per cent. of the deaths each year might be postponed; that at least 50 per cent. of all cases of serious illness are preventable; that the average of human life can be prolonged 12.3 years; that in Massachusetts 4 per cent. of the people are sick all the time, a per capita loss of $15 per year or total loss of 50 million dollars from sickness and death preventable. This does not include 12.3 years of added age possible.

One of the most valuable assets of our nation is the vital efficiency of Canada's citizens. As efficiency largely depends on good health, therefore it becomes the urgent duty of our Government to give all reasonable aid within its power to preserve the health of our people. Dr. Osler has truly said: "What is required next to popular education—education not in disease, but in health." From all parts of our country, from sanitaria, from educationists, from medical men, from insurance companies, from the public press and from all classes comes the cry, "Educate us regarding health." Commerce calls for it. The first Health Boards ever formed were established in the interests of trade and to-day all over the world commerce demands proper sanitation.

Canada, a new country, has a brilliant opportunity. Entering as we are upon a new period of re-organization and reconstruction, we should estimate at its true value national efficiency. It may reasonably be asked, what can Canada do? We are spending hundreds of millions and properly so to defend ourselves from enemies that are without. Surely it is proper also to do our utmost to protect ourselves from those enemies that are within.

Canada has two illustrious examples, either one of which she could follow with great profit to herself. She has the example of France in the inauguration and establishment of the Pasteur Institute, one of the greatest in the world, which deals not only with the health of the people, but with many other matters relating to the national prosperity and the welfare of the people of France. Or Canada may follow the example of the National Public Health service of the United States, which has become one of the most effective health services in the world. If Canada would organize her health department along the lines of either one of these, it would remain then

only for the imagination and the ingenuity of the men in charge of such a service to see how great the work accomplished by that department should be.

Mr. Carroll: Do I understand the hon. member to say that the United States has a Federal Department of Health in addition to the State Departments?

Mr. Steel: The United States have a most efficient service—a Federal Public Health service which is under the control of the Federal Government. It was found by the United States that the state boards of health did not meet the full requirements of the nation along these lines.

Let me quote an extract from a book entitled "Health and Disease," written by Dr. W. L. McKenzie, a member of the Local Board of Scotland, in which he says:

It is our duty to prevent death.

That seems like a strong statement, but perhaps it expresses the idea more clearly and succinctly than any other statement could.

It is our duty to prevent death. Out of the effort to keep alive those that would die of preventable diseases, the vast Health Service has grown. Of what diseases do we die? Of what diseases must we die? These it is our duty to answer. Until the secret of physical persistence is revealed, it is ours to reduce the agencies of death to those few that men must face and accept: to create, if it be possible, new channels for human energy, that the waste of living may fall to its least, and the wealth of living—in breadth, in depth, in intensity—may increase to the uttermost. Our service meets heroic obligations. In despair it is not desperate. As the physician never abandons the bedside until the breath ceases and the pulse fades into rest and the limbs lie without will and the eyes change their lustre and there is no more man, so the service of health watches the birth, the adolesence, the full tide, and the ebb of the social life. Never at any period is the task abated. It is the form the service of man takes equally in the day of his strength and in the last phases of his decrepitude.

The story of public health administration lays bare the nerve of social health, the minimum conditions of individual growth, the contrast between the listless neglected of 50 years ago and the skilled services of to-day. Surely the service of man owns no higher, no more honorable minister than him whose mission is to cleanse, to purify, to sweeten the bright air, to shine the light into dark places, to fill with the joy of living the highways and byways, the alleys and the lane, the courts and the winds and the reeking cloisters of the social under world. For in that dimland the primary ritual of nature has passed from the memory: misery and filth clog the spontaneity of life and overload the will; there is nothing but torpor and hunger and the melancholy vices of personal degeneracy.

So I say, with all these considerations before us, it is the urgent duty of the House to at once take steps to organize for the benefit of the people of this country, a department of public health. That does not necessarily mean the appointment of another minister, or of another whole department, but it does mean that all such matters shall be placed under the control of one head who is qualified to deal with them, and who will see that there are taken, on behalf of the people of this country, all those steps that are necessary and that will be useful for the conservation of the physical welfare of the people of our land. The prevention of disease may well be the crowning glory of Canada's civilization. It lies within our power. And if this work is to be assured of continued efficient management, it must be conducted by a thoroughly efficient organization. In conclusion, let me quote a few words from the great Disraeli on this matter. He said:

Public health is the foundation on which reposes the happiness of the people and the power of a country. The care of the public health is the first duty of a statesman.

I wish to move the adoption of this resolution.

Hon. J. D. Hazen (Acting Minister of Agriculture): Mr. Speaker, the hon. member for South Perth (Mr. Steele) should be congratulated on having brought before this House a subject of very great interest, and he is to be congratulated, also on the well considered and admirable speech in which he has moved his resolution, a speech that, I am sure, will receive most favorable comment throughout the country, and be of great value in the consideration of this matter. I am sorry that the Minister of Agriculture, within whose department this matter more especially falls, is not able to be present to-day, and, in common with the other members of the House, I more regret the circumstances which make his presence here impossible on this occasion, because the Minister of Agriculture has given a great deal of thought and careful consideration to this very important subject. If he were present I know he would be able to make an address to the House that would be interesting and illuminating, and that would give far more information than it is possible for me, temporarily filling his position—as I hope for a very short time only—to do. The hon. member for South Perth has referred to certain constitutional questions involved in this subject. I do not think there is any constitutional objection to a department of public health being established by the Dominion Government, either as a separate department or as a branch of one of the departments that at present exist, because, from Confederation down to the present hour, the Parliament of Canada and the Government of Canada have been giving consideration, and have been dealing with questions affecting public health. I think it may be fairly said, speaking from a constitutional standpoint, that while there are certain matters in public health, such as quarantines, sick mariners, etc., that come exclusively within the jurisdiction of the Federal Parliament, there are many other matters connected with public health over which the Federal Parliament and the provincial parliaments exercise a joint control. The provincial legislatures, for many years past, have been dealing with this subject by law, in practically every province of Canada. Boards of health, provincial and municipal, have been established, and these boards of health have applied themselves, with very excellent results, to the task of improving the sanitary conditions of their communities, and of handling all epidemics of contagious diseases, such as small-pox, that have arisen from time to time. They have dealt with these matters themselves and have borne the expense of them, and these Acts have been administered by officials appointed under Acts passed by the provincial legislatures.

In addition to that, the provinces of late years have been giving very considerable attention to the question of the prevention of the great white plague, tuberculosis, and in different provinces throughout Canada we find established sanatoria where those who are affected with tuberculosis in its incipient stage can receive treatment, and institutions for those who have passed the incipient stage are being established now in different parts of Canada under legislation passed by the provincial legislatures.

In my own province of New Brunswick, a splendid establishment for the cure of incipient cases of tuberculosis is to be found at River Glade, in the county of Westmorland. This institution was established through the generosity of the widow of Mr. Eben Jordan, of the firm of Jordan, Marsh & Company, of Boston, and it is administered by a commission appointed under an Act passed by the legislature of New Brunswick; Mrs. Jordan being a most valued member of that commission. In the City of St. John, the municipal authorities have erected an institution for the treatment and possible cure of cases of tuberculosis arising within the city and county of St. John. That institution is carried on under provincial legislation which provides that the province shall pay a per capita allowance for each patient who is in that sanatorium or in sanatoria of a similar character that may be established in different municipalities throughout the province. Similar legislation is to be found in almost all the other provinces.

(Continued in next issue.)

THE SANITARY ENGINEER

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APRIL 15, 1916

NEW COMPENSATION RATES

WHEN the Ontario Government finally decided that there should be brought into operation what is now known as the Ontario Workman's Compensation Act, no small opposition was put forth to the scheme.

Politicians on both sides of the House had their misgivings as to the working of such an Act. Privately owned insurance companies did all they could to block the proposition and many were the employers who asserted that they could see breakers ahead.

In fact, to many, the whole was said to be another scheme on the part of the Ontario Government to penalize business men with a view of creating a few big positions for someone.

However, things are looking very much the other way. The compensation Board have done wonders; they are to be commended for the way in which affairs, so far, have been managed.

It is no small satisfaction to sanitary and heating engineers to know that they, as a body, put forth no opposition to the scheme. This line of business men were quite willing to have the Act put into force and did all they could to co-operate with the powers that be with a view of giving the Act a fair chance.

Safety first measures were adopted wherever possible and without doubt many accidents were averted by such means.

The result is, to date, that while the rates at first instituted were felt to be somewhat high, every precautionary measure was put forth, and a reduction of rates has thus been brought about.

Sanitary, heating and ventilating engineers last year were called upon to pay a certain rate, and this year this rate will be reduced to exactly one-half. For every dollar paid last year, only 50 cents will be charged this year.

In fact, providing the wage bill is the same, that is—no higher, no assessment will be made for the reason that there are sufficient funds on hand to take care of any charges for the coming year.

Furthermore, where a sanitary and heating engineer has ceased to do business, he will be entitled to a refund of 50 per cent. of the assessment paid last year.

These conditions have been brought about, no doubt, by the fact on the one hand of the very efficient management of the compensation board and, on the other hand, by a willingness on the part of sanitary and heating engineers to do their very best to prevent all unnecessary accidents.

An official report will soon be forwarded to all members of the craft, who, no doubt, will be pleased to learn that the rates have been so very materially reduced.

FOOD FOR THOUGHT

Give me the man true to himself,
He will stick to his word like glue;
There is the chap that will get my pelf,
When I have business to do.

So, Jollier, pass 'round the other bend
With your little spiel of hot air,
When I have money I want to spend,
I'll deal with the man that's square.

Oh! the guy who can't be trusted
Is the one that gets my goat,
He's nearly always busted,
And he wears a shabby coat.

In business deals we pass him by,
He knocks his own home town;
He cannot grasp the reason why
All straight men turn him down.

All esteem to the man whose word is good,
Who honestly plays the game.
He may not be a smooth-tongued dude,
But he wins me just the same.

—*Eva E. Hamilton.*

THE CRIME OF THE UNSTAMPED CHEQUE

ONE or two cases have lately been recorded in which drawers of cheques have been haled before the courts and fined heavily for the heinious offence of omitting to stamp a cheque they have

drawn. That a good citizen should abide by the laws of his country and that ignorance of the law, or inadvertent omission of its observance does not excuse the delinquent we fully admit; but we fail to see what good purpose is served by dragging before the courts and making a misdemeanant of a man who, from sheer inadvertence and with no intent whatever to defraud the public revenue, accidentally commits an offence which is even less serious than that of slipping an unstamped letter into a letter box.

That the omission to stamp a cheque arises from pure inadvertence and not from any desire to defraud the Government, is self-evident from the fact that should the cheque by any possible chance pass the bank cashier, which is very improbable, and be paid, the drawer of the cheque stands to be by far the most serious loser through his omission, for the cheque being unstamped could not be produced in court as evidence of payment and unless he had obtained a separate receipt which is frequently not done in the case of payment by cheque, he would have no defence should he be sued for payment of the account already paid. It is, moreover, the height of improbability that any man for the sake of saving two cents would run the risk of annoying the payee or his own bank by putting them to the trouble of returning a cheque because it was unstamped.

Such a case is analogous with the stamping of an agreement in England, where, to be valid, certain agreements, by law, must bear a 12-cent stamp, affixed by the Inland Revenue officials. The omission to have the agreement stamped carries with it its own penalty, for it cannot be produced in court and is therefore valueless. In the event of a party to the agreement omitting to have the stamp affixed, and afterwards desiring to use the document as evidence, he has to pay a penalty of $50, and this frequently occurs. But the authorities recognize that no man would willingly risk such a contingency for the sake of saving twelve cents and, as far as we are aware, no case has ever occurred in which anyone has ever been prosecuted for omitting to stamp an agreement.

To anyone not bound hand and foot, and blindfolded with red tape, similar considerations would appeal to prevent the innocent drawer of a cheque from being heavily penalized for inadvertently issuing a cheque, as he has been accustomed to do all his life, without a stamp. Oh, for a business Government!

MONEY IN SPECIALTIES

LIKE all specialists, who are experts in their own particular line, and who render special service, specialties are a class by themselves.

The ordinary laborer, the handy man are not in demand to-day, as in days gone by. People are beginning to value the services rendered them by the specialist and are ever willing to pay the price. This same argument applies to specialties, goods built to give special services. The persons buying goods to-day are not looking for staple lines; they want goods of special merit. The price is not, in the main, the prime feature.

The following are a few lines which, if properly handled at this season of the year, will be of special interest to those who live in the city or town;

Instantaneous water heaters, gas stoves and ranges.

And now that winter is nearly gone, the furnace and heating system should be thoroughly overhauled, and not left till the winter time.

Bathrooms can be remodelled at these times much more conveniently now than after spring cleaning.

Cooking ranges using oil for fuel have recived much attention from manufacturers of late which has resulted in the putting on the market of quite an assortment of dependable oil burning, cooking appliances.

LIKES THE SANITARY ENGINEER

EDITOR THE SANITARY ENGINEER.—

Enclosed you will find my subscription for THE SANITARY ENGINEER for two years. I have found the paper very useful in many ways and often refer back to it for information. Some time ago I had to make up some 12-inch pipe and elbows, and, as I had not made any before, I looked up some of the back numbers of THE SANITARY ENGINEER and found what I wanted, and by following out the instructions, got them right the first time. There are other articles that I have been following, especially those describing septic tanks. There are so many different ideas as to building them down here. Some people never think of putting in a valve or syphon which, I think, is a good idea, especially in a clay soil; but most of soil around here is volcanic, and once you find a hole amongst the rock, it will take all the drainage without fear of pollution, for the ground is all porous; in fact, in the district of Mt. Eden that is the only way we have been getting rid of the house drainage. We still have the pan system, with its evils of collection, though there have been quite a number of septic tanks built, and those that I have had anything to do with have given no trouble.

I am pleased to say that we are gradually getting the drainage right throughout the district of Auckland. It has kept the plumbing trade going during this war, for there have been a few thousand w.c.'s put in, and there are still a good many to instal. As regards new work, things are very quiet, but the prospects are good if galvanized iron would get cheaper, for in some lines the price advanced 100 per cent. As there is such a lot used out here for roofing, it means quite an item on a house. I must now conclude, wishing you every success in your endeavors to improve the lot of the sanitary engineer.

W. T. FISHER.

Dominion Road, Mount Eden,
Auckland, New Zealand.

Rural Sanitation

A Continuation of the Sanitary Science Course That Has Been Appearing in the Sanitary Engineer, But Having Particular Reference to the Sanitary Disposal of Household Wastes in Unsewered Districts

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE NO. 2

THE necessity for enforcing sanitary measures in towns and cities to preserve the public health is now fully recognized, in principle at least. Such measures are not always carried out practically in the wisest and best ways. This should not cause too much wonder when the fact is considered that it is only within the last fifty years that cities and towns generally began to instal modern plants for water supply, and more recently for sewage and garbage disposal. When it comes to a question between sanitation and the expenditure of public money to accomplish it, some of our worthy citizens elected to look after municipal, provincial or federal affairs are not big enough in wisdom or vision to give to health its true value in the scheme of things. They are concerned with things that relate more directly, as they consider it, to business.

Rural sanitation has received little attention in the past even from those who recognized the necessity for urban sanitation. With all out-of-doors it seems to the layman that the farmer can have no sanitary problems like those confronting the city dweller in the confined space at his disposal. But it is a fact that farmers and the dwellers in the suburbs do suffer from diseases that can only be caused by the insanitary disposal of household wastes.

However careless of Nature's laws we have been, or may be, the question of sanitation was thoughtfully considered long ages ago. To Moses is popularly attributed the command which indicates that the Jews recognized and embodied in their laws an important sanitary regulation. In Deuteronomy, chapter 23, is found this regulation:

Verse 12—Thou shalt have a place without the camp, thither thou shalt go forth abroad.

Verse 13—And thou shalt have a paddle upon thy weapon: and it shall be when thou wilt ease thyself abroad, thou shalt dig therewith, and shalt turn back and cover that which cometh from thee.

The principle of the purifying power or action of the soil was thus evidently recognized very early in the history of man, but it was many thousands of years before the reason of it was fully understood - in fact, only about half a century ago.

During the reign of Queen Victoria there was appointed in the year 1898 the Royal Commission on Sewage Disposal to inquire and report on the methods of treating and disposing of sewage. They have published a number of interesting reports. In the final report, dated February 11th, 1915, the question of "The Disposal of Liquid and Solid Domestic Refuse in Rural Areas" is discussed. The following statement is made:

"When sewers are not available, cesspools may be utilized. If these are water-tight the difficulty of disposing of their contents is not solved, but only postponed; if not, danger may arise from their leakage to water supplies in their neighborhood."

The majority conclusions of the commission embody the following:

"Where a water carriage system is impossible because of the inadequate water supply, we believe that under proper supervision a system of dry earth closets may be open to little objection on sanitary grounds, provided the closet is so constructed that its contents can be conveniently and frequently removed, as by the use of pails." Also,

"In villages where no sewers are available, it is desirable that the cottages should be provided with ample garden space for the disposal of domestic refuse.

The use of dry earth in dry closets is of great importance, and local authority should be given full power to secure its use."

Here we find two eminent authorities: one ancient, the Bible, and one modern, the British Royal Commission on Sewage Disposal, advocating a fundamental principle in the sanitary disposal of wastes. And that principle is the purifying action of the soil, which action has now been proved to be caused by bacteria.

Although not so convenient as other methods, in which the sanitary engineer is more particularly interested, the dry earth closet properly attended to is sanitary. This is something that cannot be said of some other methods of disposal, notably the notorious cesspool. Further, there are points worthy of note about this method, which of all methods of disposal most nearly duplicates Nature's way in the wilds in taking care of animal and vegetable wastes.

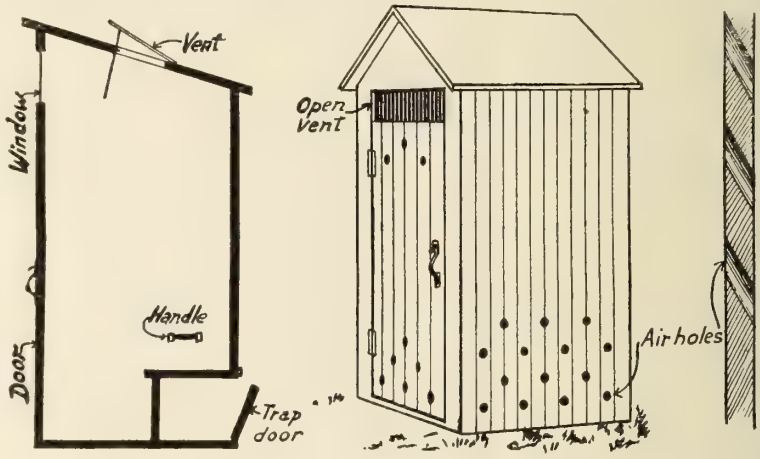


Fig. 1.
Illustrating methods of ventilating outside closets.

An excellent description of the earth closet is contained in an article appearing in the February issue of the Ladies' Home Journal, which magazine is much better known than the reports of the British Royal Commission on Sewage Disposal, and probably more read by many than the Bible. The article is entitled "The Rural Woman's Healthy Home." It is written by Alice Ravenhill, who, according to the editor's note,

has studied the subject for years in rural Canada. The first paragraph is as follows:

There are five necessities which every woman in the country has to face in order that she may keep her family well and strong:

(1) The prompt and rapid removal of all forms of refuse, solid and liquid.

(2 An abundant supply of pure water.

(3) Fresh air.

(4) Sunlight.

(5) Dry cellars, floors and walls.

Now how can she go about it? She has no plumbing, no sewer, and there is no daily collection of garbage. She does not have a city water supply, although she can have a well of pure water dug where it will not get the drainage from the barn. She also has an abundance of fresh air and sunlight.

Now, before going further, it should be pointed out that it is unfortunate that some progressive sanitary engineer has never visited this lady's home and shown her that a pressure water system, modern plumbing and a sewage disposal plant should now be counted among the necessities of every farm house. But recognizing that she has not been blest with such a visit, we must admit her wisdom as we read what she advocates lacking these necessities.

Fig. 1 shows how outside closets may be ventilated. The construction of an earth closet and how it should be attended to is described in the following paragraphs of the article, which is well worth reading:

Solid and liquid discharges from the body must be removed at once from the house and disposed of so that not only are there no risks to health, but decency and order are maintained; also valuable manure is furnished to the garden.

The daily removal of such waste allows the toilet to be near the house, within a few steps of the back door. A one-foot open space just below the roof of the closet, or a trapdoor opened in the roof, lets in the light and allows the air to pass freely and carry off bad gases.

Cut also four or five rows of one-inch or two-inch holes in the walls, boring slantwise so insects cannot enter. Nail wire netting about six inches high around the outside of the closet, over the lowest row of holes, to keep out the mice. If you can have a floor of concrete, by all means do so; otherwise hardwood treated with creosote will be good. Use hardwood treated with creosote for the seat and covers also. You can easily give them a fresh coat of creosote twice a year and so keep the closet sweet and clean.

Place the seat only fourteen inches above the floor, both for comfort and to make the care of the pails easier. Elderly people often find it hard to get up or sit down easily. Attach handles to each side of the wall and between the seats so as to make it easier for them to rise.

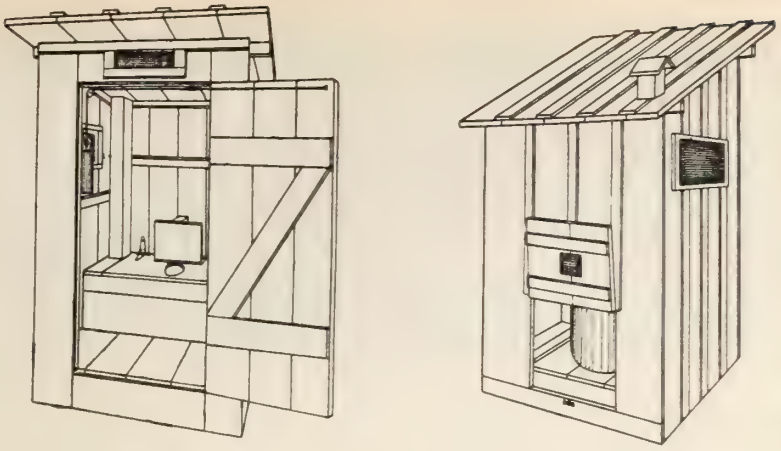


Fig 2.

To keep the pail under the seat in place nail light laths to the floor and slide the pail between them. Remove the pail for emptying through a trap door hung on strong hinges just behind the seat.

A trench six to nine inches deep must be kept dug in the vegetable garden, to receive the contents of the earth closet.

A low, separate roof supported by four posts is also needed.

Put a small quantity of dry earth in the bottom of the pail, and stand it under the closet seat to receive all solid discharges.

Cover all solid discharges at once with a shovelful of dry earth from the box beside the seat. In bad weather ashes or peat dust may be used instead of the dry earth.

Empty the contents of the pail daily into part of the fresh garden trench and cover lightly with enough earth to hide it. Plant after three or four days with vegetables of the cabbage tribe.

"But why is the dry-earth closet system of such great value? Dry earth delays rotting and prevents odors until the pail is emptied in the garden. Here the dryness of the earth and exposure of the contents to the air allow the busy beneficial germs to do their work. It is only in the last half century that it has been known that the upper layer of the soil swarms with life. Useful germs cannot live when placed too deep for the air to reach or when too wet. Thus using the dry-earth closet we hinder the harmful bacteria and aid the useful ones.

In very wet weather or during frosts empty the pail under the low roof, and cover with ashes or other dry material. This rots into a mold to be used as a fertilizer. If the pile is sheltered from the rain and snow and is kept covered with ashes, there will be no odor.

The earth-closet system is of value not merely because it deodorizes the toilet, it is of enormous worth to the garden.

To the farmer and gardener **the first few inches of earth** are worth all of the depths beneath. In this top soil thousands of useful micro-organisms live and

(Continued on page 23.)

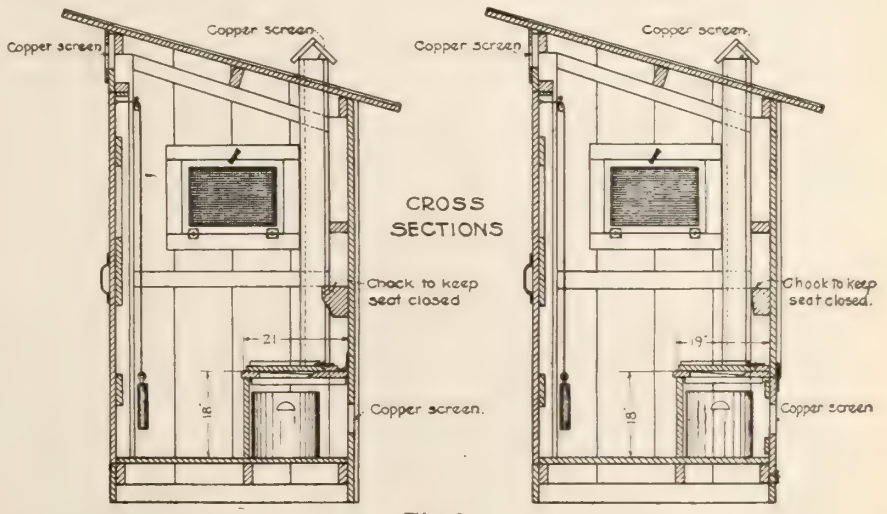


Fig. 3.

No. 1 *type with can removable through front door.* *No.* 2 *type with can removable from rear.*

NEW PLUMBING BY-LAW FOR CHATHAM

The Chatham sanitary engineers are working together in an endeavor to present a new plumbing by-law for the consideration of their local Board of Health. Mr. R. McG.Coyle said he and the plumbers in the city were revising the plumbing by-law before bringing it before Dr. Charteris. He expected that within a short time the by-law would be ready. He asked the other members to approve this action. The board commended the action of the trade, and said they believed that this was the proper way to prepare the by-law.

BUSINESS TRANSFER

W. H. Oulton Co., Ltd., Sackville, N.B., have disposed of their sanitary, heating and sheet metal department to W. W. McDonald.

Mr. McDonald has been in their employ for quite a number of years, and has earned a very enviable reputation for good workmanship, and has the confidence of a lot of people.

He will no doubt enjoy prosperous times in this his new undertaking.

E. A. JAMES APPOINTED CONSULTING ENGINEER BY COUNCIL

At a recent meeting of the village council of Woodbridge, E. A. James, of Toronto, was appointed consulting engineer, and was instructed to prepare plans for a water system. The system will include pumping station, filtration beds, standpipe and mains. The estimated cost is about $27,500. When the plans are approved by the council, a by-law will be submitted to the ratepayers. Should the property owners decide in favor of the system, it will not be commenced until about the end of the year. The water will be secured from the Humber River.

FORWELL FOUNDRY CO., BERLIN, SUFFERS FIRE LOSS

The office building of the Forwell Foundry, Berlin, Ont., was totally destroyed by fire recently. The fire department arrived when the building was a mass of flames and succeeded in preventing the fire from spreading to the moulding department, where soil pipe and fitting patterns were stored. Damage is estimated at $500, fully covered by insurance.

"BE A BOOSTER"

"Do you know there's lots o' people
Settin' round in every town,
Growlin' like a broody chicken,
Knockin' every good thing down
Don't you be that kind of cattle,
You just be a booster rooster,
Crow and boost for all you're worth.

If your town needs boostin', boost 'er,
Don't hold back, an' wait to see
If some other feller's willing—
Sail right in, this country's free;
No one's got a mortgage on it,
It's yours as much as his;
If your town is short on boosters,
You get in the boostin' biz.

If you see some fellow trying
For to make some project go,
You can boost it up a trifle,
That's your cue to let him know
That you're not a goin' to knock it,
Just because it ain't your 'shout,'
But you're goin' to boost a little,
'Cause he's got 'the best thing out.'

If you know some feller's failin's,
Just forget 'em, 'cause you know
That same feller's got some good points,
Them's the ones you want to show;
'Cast your loaves out on the waters,
They'll come back,' 's a sayin' true;
Mebbe they will come back, 'buttered,'
When some fellow boosts for you."

"Canton Aderafter."

TAKES DEAD CHUM'S PLACE

When the news reached Kingston that Pte. E. Doolan, of the 20th Battalion had been killed in action his chum, John Hutchinson, employed at the firm of McKelvey and Birch's, decided that it was "up to him" to fill the place, and he has enlisted in the Royal Canadian Horse Artillery.

AWARDED CONTRACT

The Mueller Mfg. Co., Ltd., Sarnia, Ont., have been awarded a contract for waterworks supplies by the Town Council of Wallaceburg, Ont.

DECEIVING THE PUBLIC

Letter to the Editor

Editor Sanitary Engineer,—

I have been a reader of your paper for some years and have always admired the efforts you have made in order to secure that those plying their trade as members of the craft shall be properly qualified men. I am now writing to "do my little bit," if I may use an expression much in use at the present time, to support you in your protest at a paper such as the Toronto 'Globe,' advising people to do their own sanitary plumbing. We all know that in a new country such as this is a man has to make himself useful in doing many small jobs about the house which in the older countries he would get a man in to do; but I think when it comes to putting in a sanitary system even a man with an intelligence beyond the average would be "biting off rather more than he could chew," and I am surprised that a newspaper of any standing should give such advice to its readers.

Even supposing that by giving some study to the matter a man were able to do the job in such a way as to make it a success he would find that in the long run what with the time spent on it and the money paid out for tools he would be out of pocket.

Some months back a friend of mine, a fur cutter by trade, was getting in a new stove and decided to try his hand at fixing it up himself with boiler attachments, etc. He was not trying to do this solely for the sake of saving a dollar or two, but rather out of curiosity to see whether he could manage it himself. He is a clever chap, and one who, I should

think, would be successful in any trade he learnt. Well, Mr. Editor, I am not going to tell you that he made a hash of the whole affair and finally had to get me to go and do the work, because he did not. As a matter of fact he finally made a very good job of it and it has worked well ever since; but he admitted to me afterwards that if he had paid to have the work done and had spent the time occupied at his own line of work he would have been $15 in pocket and would have avoided what to him was many hours of unpleasant and dirty work; and he is firmly decided that he has done his last plumbing job if ever there is a plumber to be got to do any work he may want done.

To begin with he fixed the boiler down in the basement with the stove in the kitchen and of course found it would not work; and as it was not convenient

WM. J. CRAWFORD
St. John, N.B., secretary St. John Branch, and vice-president of Society of Domestic Sanitary and Heating Engineers

for him to bring a pipe from the boiler up to the second floor to remedy the matter, he had to pull the whole thing to pieces and do the job all over again. I happened to call in just as he had finished and he looked as if he had just had 48 hours in the trenches where the Huns had been bombarding him with red lead. However, I must admit he made good on the job, but how many would do so? And even then, as he said, he was $15 out of pocket.

No, sir, I think that anyone who attempts to follow the 'Globe's' advice will find that sanitary engineering is a case in which the old proverb "Let the cobbler stick to his last" applies with more force than in most cases. The craze for getting things done on the cheap does not pay in the long run. If you want a good suit of clothes you must go to a good tailor. If you want good law you must go to a good lawyer; it is cheapest in the long run, though law is never cheap. If you want good medical treatment you must go to a good doctor. And so if you want good sanitary plumbing you must go to a good sanitary engineer, and for all these things you must pay a fair price.

I am sorry to have to admit that there are many so-called plumbers who are sadly lacking in knowledge and capability, but with the tendency nowadays all over Canada to bring in by-laws insisting on a man proving his ability before he is allowed to pose as a member of the craft, they are, gradually, being either brought up to the mark or weeded out; and you, sir, with your continually hammering at it, as you call it, are aiding in the good work. That your efforts may be crowned with the success they deserve is the hope of

Yours truly,
ANOTHER OF US.

Toronto, April 10, 1916.

RURAL SANITATION

(Continued from page 21.)

multiply. The gardener wants to help these organisms in bringing about desirable changes in the earth. They are active only above freezing temperature and need a moderate amount of moisture and free admission of air. It can then be understood "why" the contents of the closet pail are to be thrown daily into a shallow trench, not more than six by nine inches deep, in the garden. The object is, of course, to have the fertilizer enrich the top soil, and to keep it where it will get frequent exposure to air and moisture. In order to make the entire garden equally productive a fresh piece of trench must be used each day, covering the material lightly with just enough earth to disguise it.

The process does not demand a great amount of space. A garden of one and a quarter acres received the scavenging of twenty cottages with a population of one hundred persons, and it required four years to cover the whole ground under cultivation. The first crop taken from ground thus manured should be plants of the cabbage tribe. They may be planted in three days after the fresh material has been laid in the trench. This may be followed by potatoes with celery planted between the rows. Peas and beans are the best successors to the celery, and a crop of carrots and parsnips can be taken off afterward without any fresh manuring.

Thus one dose of the manure is sufficient for four successive crops. All ordinary garden flowers also grow to perfection in soil so fertilized.

By spending a little time and thought on how to get rid of garbage satisfactorily, health is improved and our garden is made more productive.

Figures 2 and 3 illustrate a sanitary privy or dry-earth closet designed by the Bureau of Sanitary Engineering of the State Board of Health of Maryland.

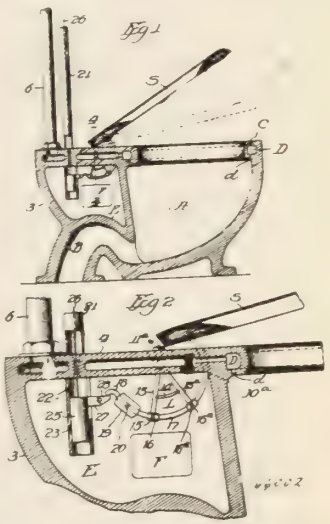
(Continued in next issue.)

New Patents

No. 166,002.

The Brunswick-Balke Collender Company, assignee of Francis Xavier Weinrich, both of Chicago, Illinois, U.S.A., 16th November, 1915; 6 years. Filed 20th November, 1914. Receipt No. 245,254.

Claim.—1. A water closet comprising in combination, a bowl, and an auxiliary chamber, a seat superimposed on said bowl, arcuate rods fixed to said seat, extending into said chamber, and oscillatibly mounted therein, and means in connection with said rods whereby a predetermined angularity between said seat and said bowl is maintained while said seat is at rest.



No. 166,002. Water Closet.

2. A water closet comprising in combination, a bowl, and an auxiliary chamber, a seat superimposed on said bowl, arcuate rods fixed to said seat, extending into said chamber, and oscillatibly mounted therein, and means in connection with said rods whereby a predetermined angularity between said seat and said bowl is maintained while said seat is at rest, and means whereby said angularity of rest may be varied.

3. A water closet comprising in combination, a bowl, and an auxiliary chamber, a seat superimposed on said bowl, arcuate rods fixed to said seat, extending into said chamber, and oscillatibly mounted therein at the radial center of said are, and means in connection with said rods whereby a predetermined

(Continued on page 34.)

New Central Technical School, Toronto

In This Article a Description of the Heaters and Heating Plant is Given, Along With a Complete Plan of Piping, Mains, etc., in Connection With the Heating Plant. Third Article of This Series Continued From March 1st Issue

THERE are three heat-distributing panels, each having nine triple pole, double throw knife switches. There are also two power-distributing panels. One of the latter has nine single throw triple pole switches and three double throw triple pole switches. The double throw switches control the elevators, machine shop, and some sections of the woodworking shop, so that these can be run by the motor generator or engines. The other power distribution panel has six inch brass tubes and has a 2-in. diameter connection. There is in addition a live steam heater which can be used to automatically supplement the exhaust steam as needed. The live steam heater is of a similar construction as the other, but is rather smaller, being 14 ft. 8 in. long over all and 49 in. diameter. It contains 640 one-inch brass tubes and is tested to 200 pounds per sq. inch. The steam passess through, and in passing condenses, transmitting its heat to the water being pumped through the heating system. The heaters were supplied by the General Fire Extinguisher Co.

In this system the temperature of water circulated can be maintained either above or below boiling point, it also can be regulated or controlled at the heaters, thus making it possible to vary the temperature of water to suit climatic conditions. Water can be transmitted any required distance with uniform velocity and small temperature loss. The combined capacity of the heaters is sufficient to carry over 250,000 feet of radiation.

There are two pumps both of the same type for circulating the water through the building. Each pump is of the single stage centrifugal type; having a capacity of 2,100 gallons per minute against a head of 80 feet. The pumps have 10 in. inlet and outlet connections and run at 1,850 r.p.m. They have horizontal split castings giving easy access to all moving parts. Each pump is direct connected by means of a flexible coupling to a single stage, impulse steam turbine, mounted on same sub-base on concrete foundations. The pumps are provided with a 1 in. by-pass valve for operating at slow speeds, and are connected to the heating system separately, so that either unit can be operated independently as desired. The pumps and turbines are of the "De Laval" type and were supplied by the Turbine Equipment Co., Toronto. The heating system was installed by the General Fire Extinguisher Co., Toronto.

Ventilating System

The ventilating system is of the plenum type, the building being divided into two sections, each having its own fan and air washer, etc. Approximately 180,000 cubic feet of air is supplied per minute, warmed to 70 degrees Fah., washed, purified, humidified and passed through over five miles of galvanized iron ducts. The two large fans installed in the sub-basement are of the "Keith" type, and were supplied by Sheldons, Ltd., Galt, Ont. Each fan is of double width and full housed, with 70 in. diameter wheel. There are two inlets each 72 in. in diameter and the outlet is 60 in. by 90 in. The capacity is 90,000 cubic ft. of air per minute when running at 180 r.p.m. Each fan is driven by a 12-in. x 12-in. horizontal central crank engine built by Sheldons, Ltd., Galt.

The air washing and humidifying apparatus was supplied by the Carrier Air Distributing Co. of America, New York. The primary heaters of the "vento" type are arranged in two groups, each three sections high and 34 wide, each section containing 13.5 sq. ft. of radiating surface. The tempering coil is made up of two and three heating coils of four banks deep, therefore the primary heater consists of tempering and reheating coils and is made up of six banks containing a total of 16,524 sq. ft. There are also six supplementary heaters each arranged in two banks of nine 60-in. sections or 8-in. centres. The total surface per heater is 198 sq. ft. or 1,188 sq. ft. in the six supplementary heaters.

Each of the above installations are provided with a damper which automatically controls the air flowing to the primary heaters. The damper is controlled by means of a "Johnson" thermostat. The coils are heated by means of hot water from the heating system, each section having an independent connection with the hot water heater; thermo-

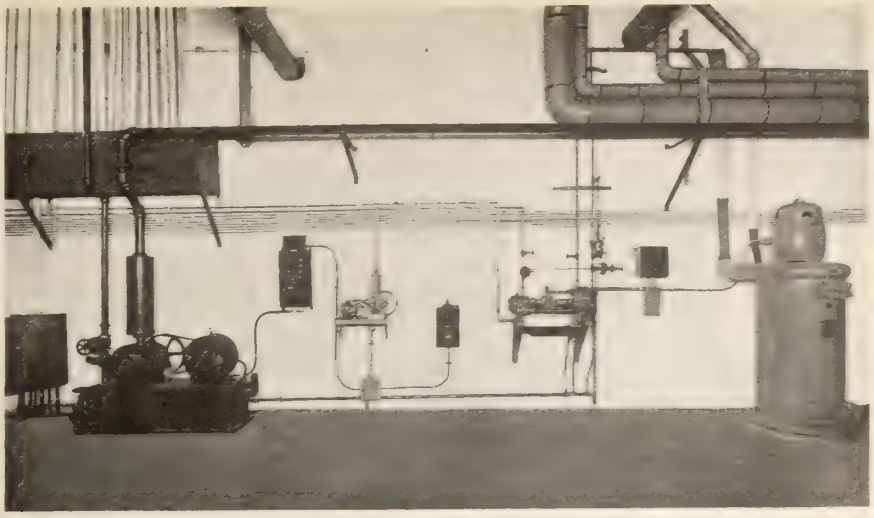
Steam and gas engine laboratory equipped with engines, turbines, surface condenser, and complete apparatus for testing power plant equipment

meters are provided for indicating the temperature of the water in the heaters.

The air washer has 450 nozzles placed 4 ft. from the eliminators which deflect the air five times and remove superfluous moisture. A tank under the air washer contains the water supply for the air washer. An automatic float valve keeps the water in the tank at a certain level and takes care of the loss of water which is absorbed by the air. The water is pumped from the tank and up to the air washer. A humidifier is connected to the water supply pipe and is arranged so that live steam at reduced pressure can be injected into the water going to the nozzle. A diaphragm on the water supply pipe controls the steam supply, the diaphragm being controlled by a thermostat in the air chamber. A Buffalo centrifugal pump driven by a 15 h.p. C. G. E. motor running at 1,250 r.p.m. circulates the water for the air washer.

There are also installed two "Keith" fans for exhausting the air from the toilets One fan is located in a shaft alongside the stairway in the north side of the building and the other fan in a similar position on the south side. These fans were also supplied by Sheldons. Ltd., and are single width full housed type. Each fan has a capacity of 4,500 cubic feet per minute at 500 r.p.m., and is direct connected to a 2½ h.p. C.G.E. motor. Each motor is supplied with starting and stopping rheostats, cut-out switches, fuses and metal containing boxes. Two "Keith" type fans of Sheldons make, are installed for exhausting from the chemical laborotories. One of these is located in a pent house on the roof in a central position, while the second fan is located on top floor on the west side. Each of these fans has a capacity of 7,000 cubic feet per minute when running at 450 r.p.m., and is direct connected to a 5 h.p. C.G.E. motor. Each motor is equipped with a speed regulating controller and a cut-out starting in a metal containing box.

The draft for the forge shop is supplied by a fan in the fan rooms. This fan is full housed and has a capacity of 2,000 cubic feet of air per minute at 400 r.p.m. This fan was supplied by the Canadian Sirocco Co., Windsor, Ont., and is driven by a 15 h.p. Canadian Westinghouse motor 230 volts d.c. The motor is controlled by a Cutler hammer rheostat. The entire heating and ventilating equipment was installed by the General Fire Extinguisher Co., Toronto. At the entrance of the large air intake in the sub-basement is a rolling door for shutting off the supply of air when the system is not in use. The door is operated by a chain connected to a worm gear drive, the worm gear being driven by a 4 h.p. motor supplied by the Northwestern Mfg. Co., Milwaukee, Wis. The drive gear is located in the air intake near the rolling door.



SHOWING ONE OF THE TUEC STATIONARY CLEANERS AND OTHER EQUIPMENT.

Fire Alarm System

A very complete fire alarm and fire-fighting system is installed. Standpipes are installed throughout the building with a fire hose service at various points in each corridor. The standpipes are connected to the city water supply system. At various points in each corridor are glass break-boxes and bells, the latter of the vibrating type with 12-in. gongs. The bells are connected in multiple and are actuated simultaneously from any one of the fire alarm boxes. Annunciators are located in the assistant principal's room, and also in the engineer's office in the sub-basement. The battery for the system is located in the sub-basement, as is also a charging panel. The fire protection system was installed by the General Fire Extinguisher Co., Toronto, and the fire alarm system by Keith's, Ltd., Toronto.

Tuec Stationary Cleaners

A vacuum cleaning system is installed throughout the building. The installation is divided into two parts each being handled by a four-sweeper 6½ h.p. "Tuec" machine installed in the fan room, thus making an 8-sweeper plant in all. There are 220 valves in the building to which 50-ft. hose lengths can be attached, and the system is of such size that eight men can clean the building simultaneously without overloading the machines. The machines were supplied by the United Electric Co., Toronto.

Temperature Regulation Systems

A certain portion of the heating system is controlled by the "Johnson" system of temperature regulation. The compressed air is furnished by a compressor in the engine room.

The ventilation is also controlled by the "Johnson" system. Roof dampers equipped with diaphragms are controlled from air operated valves located in the

METALLURGICAL LABORATORY WHERE ORES AND QUARTZ ARE ASSAYED AND PROPERTIES OF METALS STUDIED.

fan room. The roof dampers are located in the exhaust air ducts. The switches for operating these dampers are all arranged on a switch-board in the fan room, thus each damper is under the control of the engineers. The compressed air for the system is furnished by a duplex steam-driven pump located near the switch-board. There is also a motor-driven air pump used as an auxiliary. Air pumped into tank at 30 lbs. pressure; this supplies a low-pressure tank and the system with air at 15 lbs. pressure. An automatic control is fitted and so arranged that if the steam pump fails the electric pump will take its place. The heat regulating system was supplied and installed by the Johnson Temperature Regulating Co., Toronto.

(Continued in next issue)

The Cap Stone of the War

A Trade War of Tariff Walls the Certain Outcome of Present Struggle—An Accentuation of National and Racial Characteristics and a Discrimination Directed Against Central European Trade Agents in Particular and Foreigners in General

PUBLIC governing bodies are already beginning to promote activities that will insure the eventful victory of British Imperial trade in this great struggle. In particular precautions are to be taken against the activities of the commercial agents of the Central European Powers.

Sir Richard Burbidge, managing director of Harrods, London, has this to say about a tentative plan that would meet the requirements of the situation:

"The only way to beat the Germans, is to put a prohibitive tariff on German and Austrian goods that compete with those we make at home or whose manufacture we are now developing. A prohibitive tariff on foreign dyes would do more to stimulate the British dyeing industry than any other measure imaginable.

"I would have all foreign articles of luxury heavily taxed. 'Make the foreigner pay' would be my motto. It is possible that we may have to pay a little more for things, but the tariffs will go to relieve the heavy rates and they will tend to keep trade in the country and maintain employment, so that so far from having any cause for grumbling, the average man, realising the facts of the situation, will be only too thankful. Even if we pay more for a thing, the great point is that the money will remain in the country and circulate there, so that the community will have the benefit of it.

"Tax All Foreigners"

"Tax the German and the Austrian in particular, but tax all foreigners who send us goods which we can equally as well produce at home at a reasonable price. We have been obliged to buy abroad by the constant underselling of the foreigner. First we only bought 25 per cent. of our commodities abroad, then it grew until it became 50 per cent. and more, and it was impossible to do without these imports because the public would have the cheaper article irrespective of its origin. If there was a 6s. German-made bag side by side with a 7s. 6d. English-made bag, the customer would say, 'I will have the 6s. bag'.

"The remedy is clear. It is to tax the German so that he cannot undersell the English manufacturer by means of his rebates and his system of running his factory day and night, which allows, of course, of cheaper production. The German manufacturer is helped to undermine the British manufacturer's trade. We had evidence before the Tariff Commission that iron in Germany was sent out to be sold at £2 10s. per ton less than the home price.

"Encourage the British manufacturer and it will not be found that he is wanting in enterprise. But he must have security for his capital. It is no use his laying down expensive machinery if the next month he finds the market flooded with imitations of his manufactures at cheaper prices than he can sell them. How often have we found this happen! One has only to quote the instances of Birmingham jewellery imitated in Germany and sold here for 25 per cent. less.

"In the coming trade war we must see that German goods bear the mark of origin. In the past we have been rather lax on this score. We have seen that the boxes were stamped 'Made in Germany', but we never took the care that we should have done that the articles themselves were so stamped. In the future there must be no possibility of such negligence occurring. Let people see that mark, 'Made in Germany,' and if they have lost a near and a dear relative in the war, or if they are as keenly patriotic as we expect, they will shun those articles. It will be almost a matter of conscience with them not to have anything to do with them.

"I can tell you what Harrods' plans are in this matter. Whether the Government proposes to put a tariff on German goods or not, and whether they are cheaper or not, our buyers will have orders after the war to buy only from British manufacturers and from manufacturers in the Allied countries. Where purchases are made in neutral countries it will be their business to see that there is not the slightest suspicion of the goods being of German origin.

"Already we are opening up negotiations with, and sending buyers to America and Canada, and in due course they will go further afield, to Russia, for instance. I am sure we shall be able to do without Germany.

"While I would tax the foreigner I would relieve some of the commodities which we get from our Colonies and Dependencies; tea, for instance, with its 100 per cent. duty—and we still speak of 'the free breakfast table'! In fact, I would give a preference to everything that comes from our Dominions.

Improve Our Consulates

"It is possible that the German might come over and start business here, despairing of competing against our tariff wall. In that case I would have some special rating put on him. He must not be allowed to work side by side with the Englishman, his enemy, on equal terms.

"In the coming trade war I would have our Consulate system improved. I would have them run on commercial, not exclusively on diplomatic and social lines. One further point. I see it is suggested that the Continental trip is a temptation to buyers for English houses to go abroad to make their purchases. That is not the case with us; indeed, quite the reverse. We have the utmost difficulty in persuading our buyers to go abroad. They have been inclined to buy from the agencies established here.

"The Continental trip may be a holiday for the buyers of firms who let them go away for a week and don't mind what they do, but in the case of Harrods I can assure you it is no holiday, for we have our own house in Paris to which our buyers visiting there report every day. Usually when they are making purchases they are accompanied by a member of the Paris branch."

Analysis of Canadian Sanitary By-laws

Being a Proposed By-law to Regulate Sanitary Engineering Construction in the City of Ottawa—The Sanitary Engineer Takes Full Responsibility for All or Part of Any Criticism Made on this By-law.

Article 2.

THERE are several sections to be commented upon in this article which every reader of The Sanitary Engineer will be particularly interested in, some of which have never been embodied in any Canadian sanitary engineering by-law before, and which are at present nowhere in force.

Sec. 15. Tile pipe in underground drainage shall be of the best material and workmanship, and free from all blisters, cracks, flaws, or defects of any description.

Sec. 16. All changes in direction shall be made with "Y" junctions and curved bands; no right angle junctions will be allowed; all joints must be put together with the best Portland cement properly mixed and tempered, and finished flush with the edge of the pipe, the joints on the inside of the drain to be in all cases properly cleaned and finished so as to be perfectly free from all burrs; drain shall have a fall of not less than one-quarter of an inch to the foot between main sewer and building.

Sec. 17. All private drains are to be taken to the outside of the wall.

Sec. 18. Not more than two (2) tenement buildings shall (except so far as herein otherwise expressly provided) be connected with any private drain of six inches or less diameter.

The above sections are general, with one exception, that of section 18, where it allows two, though not more, house drains to be connected into one private drain.

In many Canadian cities the law requires that every house drain shall have its own and separate sewer connection.

The Sanitary Engineer can see no reason why so many branches are required from the main sewer.

The City of Winnipeg are at this very period suffering as a direct result of such an arrangement.

Of course, if two house drains are connected into one private sewer branch, there should be a good clean-out placed in such a position that cane cleaning rods can be inserted to clear out any stoppage between the main sewer and the house drain.

Sec. 19. Every building while under construction, or building alteration, shall be provided with its proper main drain and have connected thereto water closet accommodation, hopper or washout pattern will be suitable, for the convenience of the workmen engaged theron, same to be supplied with City water, but every hopper or washout closet so used shall be disconnected and removed before work is completed.

Section 19 is a splendid one. It is one which will prove of great benefit to workmen during the period when the building is under construction, not only as a necessity, but from a financial standpoint. There is also another reason why such a section is a good one:

Many a time a building has been started, the roughing in has had to be tested, and there has been no provisions for draining the water away from the building, and oftentimes a large quantity of water has leaked into the basement during construction which could not be drained off on account of there being no drain outlet to the main sewer. But seeing that some kind of conveniences are to be provided for the workman, no doubt an outlet to drain the cellars will also be temporarily provided.

Sec. 20. The use of privy vaults is prohibited.

Sec. 21. All rain water hoppers placed within ten feet of any opening shall be trapped if connected with the draining system of the building.

Sec. 22. All pipes for surface or weeping drains shall, where in the opinion of Medical Office of Health this is practicable, be brought to the inside of the building and trapped, and shall be connected with the cast-iron house drain and such traps shall be fitted with clean out screws and shall not be used as cellar drains.

Sec. 23. No blow-off from any steam boiler used for power or heating purposes shall discharge into any private drain, but the same shall discharge into a blow-off tank properly supplied with City water for cooling purposes, and shall have a vapour pipe extending to the open air.

Sec. 24. So much of every drain used for sewage or waste water as lies under and inside the building, shall be constructed of cast iron or wrought iron galvanized pipe and shall have galvanized recessed fittings of the kind and weight specified by this By-law. When such drain is laid in earth or concrete, each branch shall be a separate "Y" branch. Lead waste pipe shall be restricted to short uprights.

Sec. 25. Each building shall have its own separate soil pipe of four inches or larger, and a separate drain, and such soil pipe shall be placed so as to permit the convenient inspection thereof without damage to walls.

Sec. 26. Every master plumber and every journeyman plumber shall be responsible for the proper connection of all work placed by himself or his workmen with the system of drainage of the building.

Sec. 27. No two, or more than two, tenements and no other building shall have a drain in common with any other building or separate habitation in such tenement inside the external walls of the house or building which it serves, except in cases where there are two buildings on the same lot, one in the rear of the other; in such case, if there is no sewer or drain in a lane, alley or street to which the rear building can be conveniently connected, the drain serving the front building may be extended to serve such rear building.

Sec. 28. All drains constructed of cast iron or wrought iron galvanized shall have at least two clean-out screws, one on each vertical soil or waste pipe, and one where the drain enters the building.

The above sections are all very practical and necessary in every town and city plumbing by-law, though in the opinion of The Sanitary Engineer, section 28 could have been improved.

For instance, under this section simply two cleanout Y's may be furnished—one at the foot of the soil pipe stack and another where the house drain leaves the building. No mention is made as to the distance between those two cleanouts.

If such horizontal run is more than 30 feet, there should be a cleanout and Y brought to the surface. Thirty or more feet is too long to have to push a rod through in a basement. Many plumbing by-laws in Canada and U.S.A. demand a cleanout opening not less than every 25 feet.

Sec. 29. Clean-out screws shall be of the same size as the pipe to which

they are attached, except while the pipe is larger than four inches in diameter, when screws of four inches in diameter will suffice, and all such clean-out screws shall be made of extra heavy brass not less than one-eighth of an inch thick.

Sec. 30. When alterations only are made in the plumbing of a building already drained by a tile drain, such tile drain may be continued in use if it is tested and found satisfactory by the Medical Officer Health.

Sec. 31. All pipes, tees, bends or fittings of cast iron shall be of good quality, and shall be free from flaws or defects, and shall be of uniform thickness. Untarred pipe and fittings only are to be used above ground. All cast iron pipes, tees, bends or fittings used above ground shall be immersed in linseed or other vegetable oil, or shall receive such other coating as the Medical Officer of Health may from time to time approve of, to prevent rusting.

Sec. 32. All traps and fittings shall be equal in quality and thickness to the pipe to which they are attached, and shall be subject to the approval of the Medical Officer of Health, who may reject any fittings which in his opinion are not suitable or sufficient for the work.

Sec. 33. Whenever it is proposed to drain a stable through or under a building used as a residence, the drain shall be constructed of cast iron pipe and the stable drain shall be vented up and through the roof of the stable by a pipe four inches at least in diameter, and all floor drains shall be properly trapped. The use of Bell traps is prohibited.

Sections 29, 30, 31 and 32 are general, and to be found in most plumbing by-laws. Section 33, however, is to some extent a little different. Of course, it would be understood that while this section almost infers that a stable may be drained through a house drain, no doubt if it is possible to drain it separately by providing such a drain down an alleyway, such a drain would be demanded.

Then, again, it will be noted that no Bell traps are allowed. We presume this not only means in connection with stable floor drains, but also in connection with the house or cellar floor drains.

It is very much to be regretted that even in Toronto the Bell traps are still permitted, as also are tile drains within the walls of a building.

Sec. 34. No cast iron or wrought iron pipe used for soil pipe shall weigh less than specified in the following table, per length of five feet:—

2-inch inside diameter	20 lbs.
3-inch inside diameter	35 lbs.
4-inch inside diameter	45 lbs.
5-inch inside diameter	66 lbs.
6-inch inside diameter	75 lbs.
7-inch inside diameter	135 lbs.
8-inch inside diameter	167½ lbs.
10-inch inside diameter	225 lbs.
12-inch inside diameter	270 lbs.

The above section, too, would stand a little more detail, viz., "that all soil pipe shall be true to the core; the walls of the pipe to be even in thickness, fine in grain, and not too hard. There is quite a difference, sometimes, in soil pipe, and a cheaper grade might easily be procured at times by men who are only in the plumbing business for the money there is in it.

Inferior pipe may be poorly moulded, not round, etc., and in many ways inferior, yet at the same time fill all the requirements under section 34.

(Continued in next issue.)

REVISED ONTARIO WORKMEN'S COMPENSATION RATES

The new rates struck by the Workmen's Compensation Board of Ontario have been assessed against the various trades and industries. Hardwaremen who have tinsmiths employed on outside work will come under the operation of the Act this year. The rate which has been assessed is 1½ per cent. of the amount of wages paid to employees engaged in those occupations. In other words, for every $100 of wages paid to an employee there must be paid to the board by the employer $1.50.

This is a substantial reduction from that charged under last year's assessment. The rate last year was $2.50 for each $100 in wages. There was a difference, however, in that tinshops employing less than four men were excluded altogether. Under the new rate of assessment and new regulation applying thereto the tinshop is assessed if there is only one employee engaged. The distinction is made between an employee who goes off the premises to do tinsmithing or who is engaged in setting up furnaces, and one who remains on the premises of the merchant to do his work. When the tinsmithing is in the nature of odd repair jobs done on the premises by a clerk, perhaps, this assessment does not apply.

In the classes which apply to plumbing, gas and steam-fitting, sanitary heating and engineering the rate is $1 for each $100 of wages. This is a reduction of $1. This rate is made retroactive from January 1, 1915. The old rate of $2 for each $100 of wages has been considered unduly heavy and a very substantial reduction has accordingly been made. Where the assessment has been paid for last year the new rate will mean that the employer will not be called upon to make payment this year. The retroactive feature will be applied in the nature of a refund by a reduction of the assessment for the present year. In cases where the firm has gone out of business and has paid the assessment the money will be refunded.

For sheet metal work and roofing there has also been a substantial reduction, the new rate being $1.50 as compared with $2.50 for the old rate. Painting, decorating or renovating have been reduced from $2 to $1 on each $100 of wages. The new table of rates will be printed and ready for distribution in a few days.

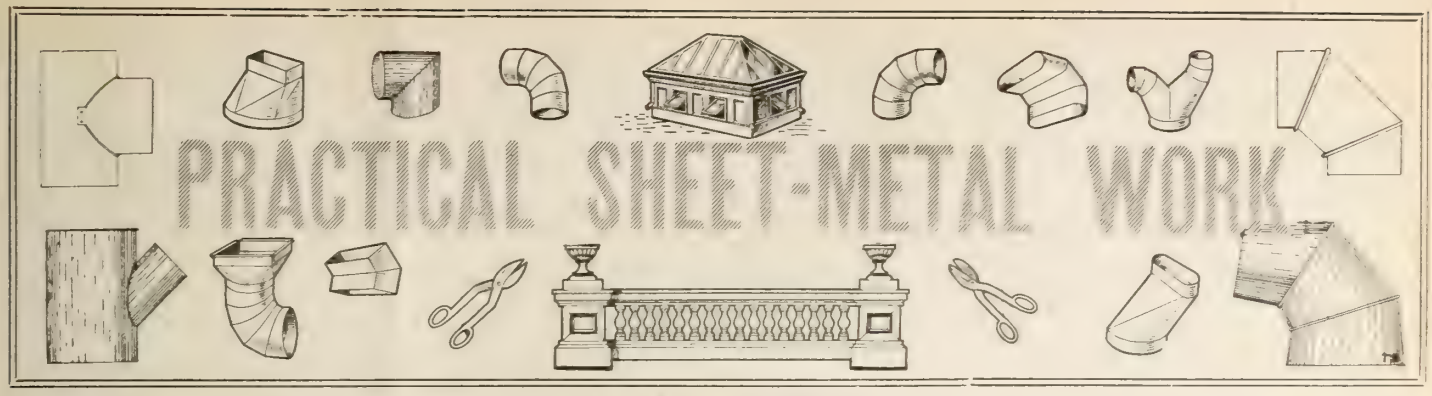
LIKES THE SANITARY ENGINEER

EDITOR The Sanitary Engineer.—Enclosed you will find my subscription for The Sanitary Engineer for two years. I have found the paper very useful in many ways and often refer back to it for information. Some time ago I had to make up some 12-inch pipe and elbows, and, as I had not made any before, I looked up some of the back numbers of The Sanitary Engineer and found what I wanted, and by following out the instructions, got them right the first time. There are other articles that I have been following, especially those describing septic tanks. There are so many different ideas as to building them down here. Some people never think of putting in a valve or syphon, which, I think, is a good idea, especially in a clay soil; but most of soil around here is volcanic, and once you find a hole amongst the rock, it will take all the drainage without fear of pollution, for the ground is all porous; in fact, in the district of Mt. Eden that is the only way we have been getting rid of the house drainage. We still have the pan system, with its evils of collection, though there have been quite a number of septic tanks built, and those that I have had anything to do with have given no trouble.

I am pleased to say that we are gradually getting the drainage right throughout the district of Auckland. It has kept the plumbing trade going during this war, for there have been a few thousand w.c.'s put in, and there are still a good many to instal. As regards new work, things are very quiet, but the prospects are good if galvanized iron would get cheaper, for in some lines the price advanced 100 per cent. As there is such a lot used out here for roofing, it means quite an item on a house. I must now conclude, wishing you every success in your endeavors to improve the lot of the sanitary engineer.

W. T. FISHER.

Dominion Road, Mount Eden,
Auckland, New Zealand.



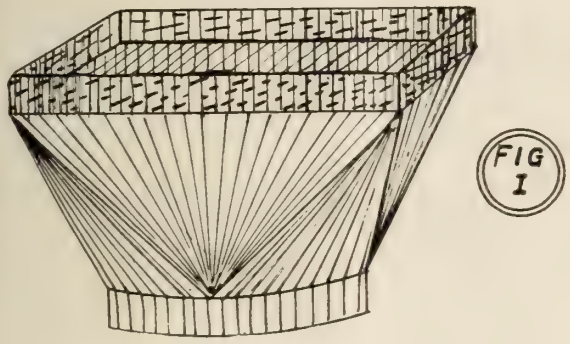
By CHARLES SEIVERS

IN Fig. 1 we show a sketch of what is known as a register box or a round to square. Such fittings are very common to the furnace-maker. The same method is necessary when an ordinary square to round taper piece is required for an extension to a chimney except that the square portion is made to fit the chimney. No matter what length the piece is required, from the round to square, the same method is adopted.

We will now turn to Fig. 2. The outer lines are the actual elevation of the article required. E F G H is the portion which is to be square to round. A B C D are simply the collars. Having determined the sizes, make the plan as aforementioned which is really a series of angles. Now erect a vertical dotted line I J and draw dotted lines from E J and F J; then extend dotted lines, or transfer the same measurements as shown in Fig. 3.

Taking M as centre, place compass at J in Fig. 2, and open up to G, this being the diameter of the round portion. Then make circle as shown, or half this pattern will do, but by drawing the whole as shown, one can see both views in Figures 2 and 3. Next divide the arc as shown, after erecting the various angles, and be sure to have the portions very accurate, as shown in P 1, 2, 3, 4, 5, 6, 7, 8. These lines represent the various angles required as well as the height from I J and G E. We will now turn to Fig. 4.

Draw a horizontal line R S; then place the point of compass at P, Fig. 3, and open up to 8. Transfer this to R and form R 8; then repeat with P 7, again transferring this measurement to R 7,



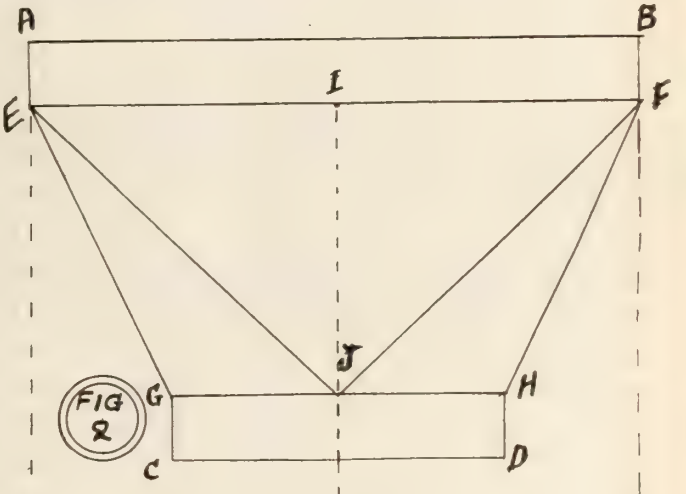
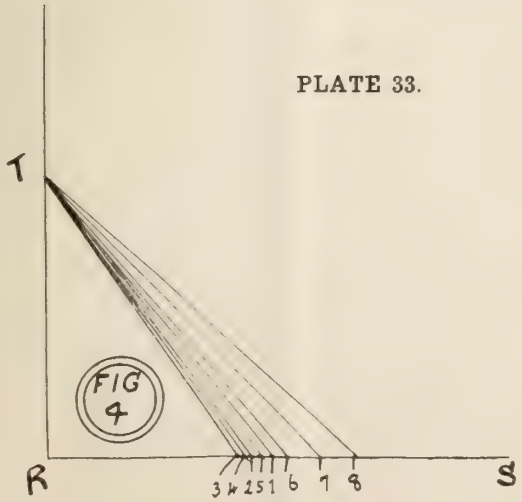
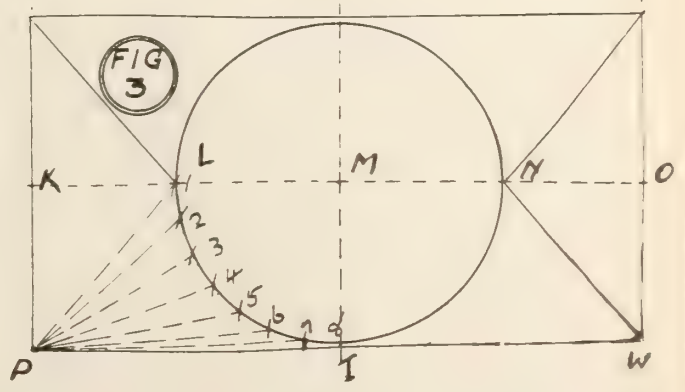


PLATE 33.





and so on until all have been transferred. Then from R erect a vertical line equal in height to J I in Fig. 3. Next draw a series of angles as shown T 3, T 4, T 2, T 5, T 1, T 6, T 7, T 8, Fig. 4. These represent the actual length of the lines in Fig. 3, P 1, 2, 3, 4, 5, 6, 7, 8, which is really only the quarter pattern.

We will now turn to Fig. 5. Using E as centre and with radii equal to the various lines shown in Fig. 4, from T 1 to S transfer them to Fig. 5 in small arcs. Next open the compass and mark off these arcs with the spaces on quarter circle, P 1, 2, 3, etc., to 8 in Fig. 3. This completes the stretch-out. Next using L in Fig. 5 as centre and E G in Fig. 2 as radius, describe an arc E i, Fig. 5. Then with E as centre and P K in Fig. 3 as radius, form another arc to intersect arc E i. Then draw a line from 1 to E i and from there to E, which will give the desired angle to form one-half of one side. Then draw the various lines the desired height, K A Ai and B and Bi, and so on, which will give the one-half pattern, the outer dotted lines are for the seams. And, if this fitting is required to be made from small pieces, a quarter pattern will be sufficient, except that material must be allowed extra for seams at J 1, Fig. 5 turnings the pattern over to form the left or right halves.

(Continued from page 42.)

PLATE 33.

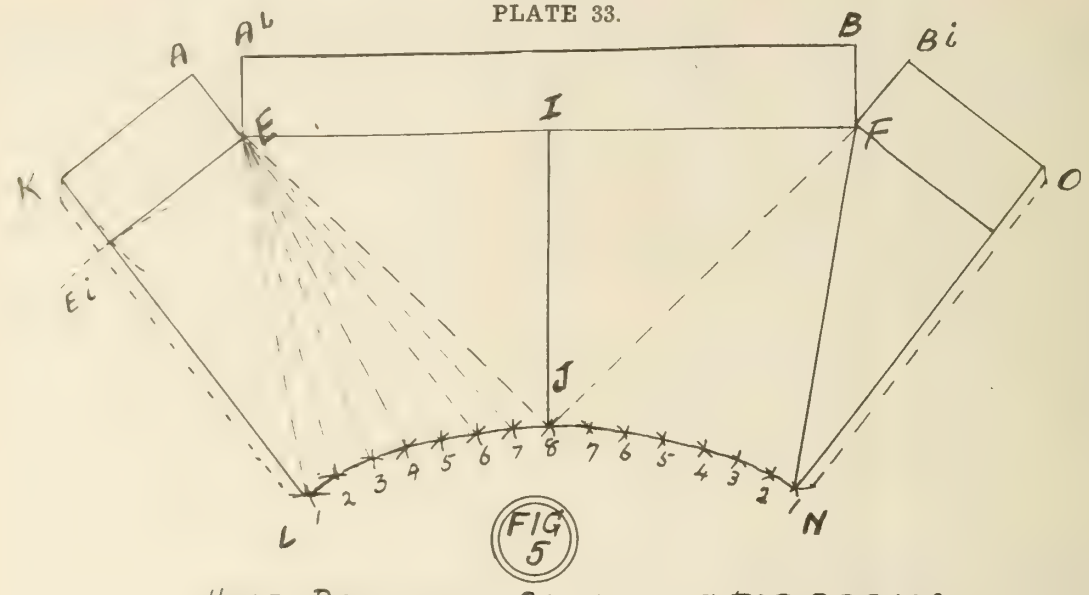


FIG 5

HALF PATTERN ALLOWING FOR SEAMS

Expansion and Contraction

Describing the Part They Play in the Science of Sanitary and Heating Engineering

Written specially for The Sanitary Engineer by Professor Arthur Bateman, Anglo American Sanitary Correspondence College.

NEARLY all bodies expand when heated, and contract when heat is abstracted. However, there are exceptions to all rules and the peculiar behavior of water typifies this contention.

At 39 degs. Fah. the molecules of water are as closely packed together as it is possible to have them under normal conditions and at this temperature water reaches its exact or maximum density.

In opposition to the general rule water expands on cooling and increases its volume until the freezing point is reached at 32 degs. Fahr. It then expands 1-10 its own volume and is capable of exerting the enormous pressure of 33,000 pounds per square inch.

This expansion may be considered irresistible and the smallest quantity of water confined in a crevice of a rock, water converted into ice, will dislodge a rock weighing several tons.

Should a water pipe become frozen the expansion of the ice tears a rent in it, whether it be iron, copper, or lead, through which the water flows freely when the temperature rises above 32 degs. Fahr.

At one time Jack Frost was looked upon as the plumber's mutual friend and much repair work was always in evidence at the opportune time when building operations were suspended, but the day of the pipe artist has gone and now our modern sanitary engineer obviates the havoc wrought through burst pipes, by placing them in positions where Jack cannot hurt them, and when such a procedure is impracticable, care is taken to protect them with an adequate non-conducting material, such as hair felt, silicate cotton, etc.

Water when heated from 39 degs. Fahr. to boiling point 212 degs. Fahr., expands approximately 1-25 its own bulk, so that in a domestic hot water system every 25 gallons will increase to 26 gallons when heated, and care must be exercised to make provision for this expansion.

If the hot water boiler is supplied direct from the street pressure no expansion tank or pipe is used, the expanded water simply forces itself back into the street main. However, should the boiler be supplied by gravitation from a tank fixed above the highest fixture, an expansion pipe should be taken off the top off the boiler and be carried above the discharge into the tank.

Assuming no provision is made for expansion in this instance, the water will be under pressure and will eventually force its way through the cold supply and water in the tank, or the weakest part of the apparatus will burst.

On reaching 212 degs. Fahr. the water changes from a liquid to an invisible gas, steam, and expands 1,728 times its own volume. From this we see that one

cubic inch of water when converted into steam occupies a space of one cubic foot.

This extraordinary expansion has been utilized to excellent advantage throughout the world, and if we heat a small quantity of water in a receptacle of sufficient strength to retain the steam, twenty-four thousand horse-power can readily be attained.

Sanitary and heating engineers were among the first to grasp the vast opportunities presented through this expansion and they now furnish steam heat, at any desired pressure, in any building under the sun.

Many lives have also been lost, including some in our own profession, through the enormous development of power in the ordinary range heater. The failure of the water supply, through frost, stop cocks, check valves, and other causes, permitted the heaters to become red hot, and the smallest quantity of water passing into them being converted into steam and confined, developed sufficient power to explode them, shattering the buildings and causing many fatal accidents.

Almost all solids expand when heated and contract when heat is abstracted. In the expansion of solids we sometimes refer to change of volume and sometimes to change of length.

Assume a piece of lead increases its length 1 per cent., while its breadth and thickness remain unaltered, its bulk or volume will increase by 1 per cent. Let us now assume its breadth is increased by 1 per cent., the volume will receive a new addition of 1 per cent. Finally assume the thickness has increased by 1 per cent., the volume will once again be increased by 1 per cent., making in all an increase of 3 per cent. in volume for the increase of 1 per cent. in the three linear dimensions.

The expansion, either length or volume, due to a change of 1° in temperature, is called the coefficient of expansion, and varies for the same substance at different temperatures, usually it increases as the temperature increases.

The metals sanitary engineers are interested in do not expand alike, and the following gives their correct order, the first possessing the greatest proportion of expansion and the last the least:—Zinc., lead, solder, tin, brass, copper, wrought iron, cast iron.

Lead when heated from 32° Fahr. to 212° Fahr. has a linear expansion of 1 in 360. Obviously a very small amount, yet the results are most serious.

Let us take for example the costly, filthy, and unsanitary lead-lined sink, which is still advocated by a few of the old school of plumbers. The flow of hot water expands the lead, next comes the cold water causing it to contract, and this continuous expansion and contraction eventually cracks it. This is soldered, and insult is added to injury, for the procedure renders the expansion and contraction uneven, and in a remarkably short time another crack appears right by the edge of the solder where the irresistible expansion was retarded.

Practically the same remarks apply to waste pipe connections with lead closet bends, which are prohibited in many localities. The discharge of hot water from bath tubs and lavatories causes continuous expansion and contraction, with the inevitable result, the connections break.

Again, the lead drum trap, with its lead connections, will shortly be a nonentity, for in the large hotels and residences, where the tub is used at least

PROF. A. BATEMAN

once daily, the connections are for ever breaking, and when this occurs the lead trap and connections are now superseded by iron or brass.

Still further, in those countries where lead is extensively adopted as a roof covering, the greatest possible care has to be exercised in arranging each piece in such a manner that it has perfect freedom to expand and contract, otherwise it will crack and the results are disastrous. It is a common practice to arrange the drips in gutters at intervals of every eight feet, and no piece of lead should contain more than eighteen feet.

Most sanitary engineers are wise to the fact that lead contracts on cooling, and if the lead joints on cast iron pipes are imperfectly caulked to solidify and make good the contraction of the lead, they rarely stand the test to which they are subjected.

The expansion and contraction in wrought iron and copper hot water pipes must be provided for by fixing them on rollers and using wide radius bends. Pipe hooks should never be used to fasten them to walls, as the constant thrust and pull will eventually loosen the hooks and doubtless produce traps, air locks, etc., if the pipes are in long lengths. Where hot water pipes pass through plastered walls they should be wrapped with asbestos or similar material, which will take care of the expansion and contraction, and obviate damage to the interior plastering.

A very excellent illustration to show the expansibility of copper is to use wiped or soldered points in connection with hot water pipes. No matter how excellent the joints, the unequal expansion and contraction of the solder and copper will cause the joints to leak in an astonishing short time.

The expansibility of air is of great importance to all sanitary engineers. It plays an all important role in the ventilation of buildings.

In gases, no cohesion exists between their particles; in fact, they are self-repellent and expand themselves so as to occupy the whole space in which they are confined. This is readily observed in the event of the slightest escape of sewer or coal gas into the building.

Air expands or contracts .00203 of its volume for every degree it is above or below 32° Fahr., and this expansion and contraction is for ever taking place in the atmosphere, producing the winds, likewise in the rooms of all our buildings setting up winds on a small scale. The air when heated by any method in any room expands, and the excess volume escapes through the ventilator outlet, or up the chimney, fresh and colder air entering through every available opening and keeping up an everlasting movement.

NEW BOOK ON ELEVATORS

One of the latest technical books to be brought to our notice is one entitled "Elevators," by John H. Jallings, M.E. Mr. Jallings has no doubt had considerable practical experience, or he could not have written such a valuable book.

It is simply written, is easy to read and understand. Its opening chapters describe the elevator of historical days right up to the present period.

Part 1 contains fourteen chapters, dealing with:

Hand-power elevators.
Belt-driven elevators.
Worm and gear drives.

Part 2 contains 20 chapters, and describes:

Steam-driven elevators.
Hydraulic elevators.
Limit valves.
Reverse plunger types.
Direct-plunger types.

Part 3 deals with electric elevators.

Motor design, modern types.
Various type of controllers.
Transmission and traction elevators.

It is not only a suitable book for those interested in elevator construction, but also for any person engaged in a mechanical occupation.

Full particulars may be procured by dropping a postcard to Technical Book Department Maclean Publishing Company, Ltd., University Avenue, Toronto, or the American Technical Society, Chicago.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

WHAT IS THE LAW REGARDING SEWAGE DISPOSAL IN ONTARIO?

Editor The Sanitary Engineer.

I have been very much interested in the articles you have published on septic tanks from time to time; but I read the article in the Toronto Globe recently where some farmer had a cess box installed, and where the overflow was allowed to overflow into a creek.

I am about to instal several jobs of plumbing this summer for farmers, and do not want to run them into needless expense.

I know from reading The Sanitary Engineer that you do not approve of cesspools; but I know of cesspools that have been installed by competitors of mine, which work I lost on account of my price being too high. Of course, my price included a septic tank and field disposal tile bed.

What I want to know is this, what is the law regarding sewage disposal in country or farm homes where there is no drainage system?

Rural S. E Ontario.

The following is taken word for word from the Ontario Provincial Health Act:

It will be seen that there are no hard and fast rules as to the construction of sewage disposal systems, but it is next to impossible to instal a cesspool which would not in time pollute either the ground or water in its vicinity; and the trouble is that the owner of a cesspool never can tell how, when or where pollution is going to take place.

There have been found cases of pollution of wells resulting from cesspools over a mile away. The writer had an experience along this same line. A certain customer had sanitary fixtures installed, and when the question of sewage disposal was to be considered he decided not to go to the expense of a septic tank. The writer refused to connect the plumbing to a cesspool, and left the job incomplete. This man got [illegible] built a cesspool and got another plumber to connect up the system.

It took several years to find out that the ground was being polluted, and wells all around the district became tainted.

Extract From Health Act, Ontario

(1)—No garbage, excreta, manure, vegetable or animal matter or filth shall be discharged into or be deposited in any of the lakes, rivers, streams or other waters in Ontario or on the shores or banks thereof.

(2)—The owners and officers of boats and other vessels plying upon any such lake, river, stream or other water shall so dispose of the garbage, excreta, manure, vegetable or animal matter or filth upon such boats or vessels as not to create a nuisance or enter or pollute such lake, river, stream or other water.

(3)—Residents of a health resort or summer resort shall so dispose of garbage, excreta, manure, vegetable or animal matter or filth as not to create a nuisance or permit of its gaining entrance to or polluting any such lake, river, stream or other water.

(4)—Any person who contravenes any of the provisions of this section shall incur a penalty not exceeding $100. (See 6 Edw. VII., c. 19, s. 32.)

Regulation 4—Every plan of sewage disposal shall, before its establishment, be approved by the Provincial Board of Health.

* * *

ONE SEPTIC TANK FREEZES, OTHER DOES NOT

Editor The Sanitary Engineer.

Will you please explain why it frequently happens that one septic tank freezes and another does not?

I have installed several jobs, and have had trouble with only two freezing up.

I have installed two jobs within a stone's throw of each other; one freezes up, the other does not; in fact, it is working perfectly. Both are on the north side of the houses which they serve. These septic tanks are built on the regular syphon action plan. Should the air vent in the tank be closed up in winter so as to keep the cold air from passing over the contents in the tank?

J. B. R.

Replying to the above, we would like all inquirers to furnish us with their names and addresses. Here is a case where further particulars are really necessary to enable us to answer the question properly, and we should have liked to write for them. However, we can only make an attempt at answering the question.

There may be many things which might contribute to the one septic tank freezing, and the other not. In one household there may be a quantity of soap used, which is charged with antiseptic chemicals. This would kill the bacteria, and the contents would be apt to freeze.

Again, the roof of one house may be of such a design as to protect the soil pipe terminal from the north wind, or the soil pipe may be passing through a warmer place. These conditions would cause a more active draft through the soil and vent pipe, thus drawing too much cold air through the tank.

We would advise trying to overcome the trouble by using a box or half an apple barrel. Cut a hole in bottom to allow vent pipe to project up to within a foot of the top of the half barrel. Then fill it with good quantity horse manure and straw. Do not pack it too tight. Put board over top to keep rain out.

Failing fuller particulars, this is the best advice we can give in the matter.—Editor.

* * *

SHOULD MAIN PIPES BE RECKONED?

Editor The Sanitary Engineer.

I shall be very much pleased to see further articles in The Sanitary Engineer describing septic tanks, etc.

(Continued on page 34.)

Never Make a Snap Decision

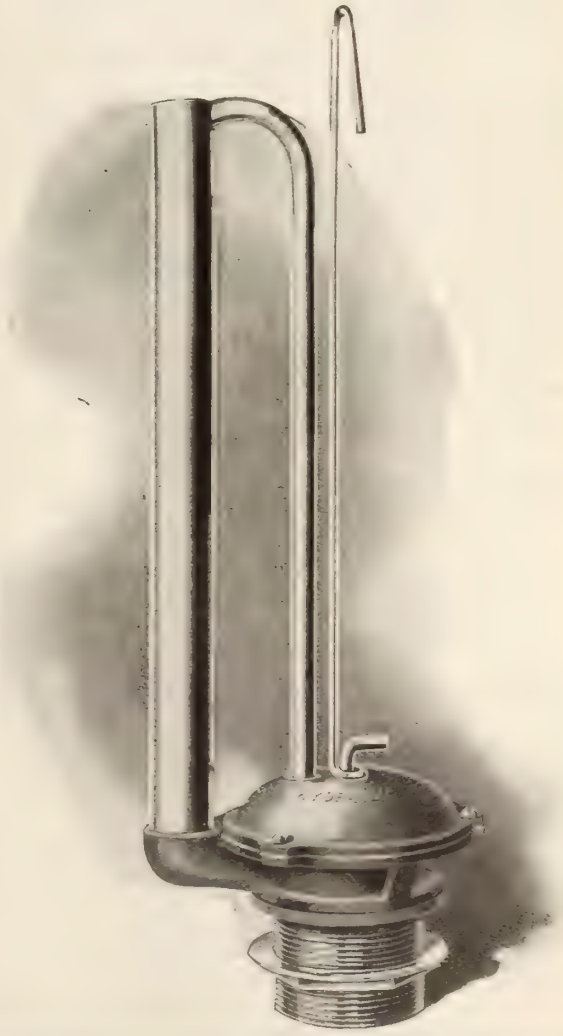
Consider other makes of Closet Combinations; then *consider* the "Regal" Closet, as shown below.

When you *consider* the risks you are taking with the ordinary Plumbing Fixtures and compare them with the satisfaction of using Mueller Guaranteed Products, the attendant benefits mutually enjoyed by your customers and yourself, we are willing to abide by your decision.

Plate No. 1505 "Regal."

The Tank used in the "REGAL" is made of the famous "ARMCO" Ingot Iron, Porcelain Enameled Inside and Outside, and is fitted with the "Hydraulic" Flush Valve which we show below.

We FULLY GUARANTEE our Products.



If you have ever used the "Hydraulic" Flush Valve the chances are 100 to 1 that you now use them exclusively

If you insist upon it, **any make** of Tank that you may buy will be equipped with the "Hydraulic" Valve, but you **must** insist and accept no substitute.

The "Hydraulic" will fit any Tank and give **Perfect Service.** Always install them on your repair jobs and make everlasting friends of your customers.

Write To-day for Our New Closet Catalogue.

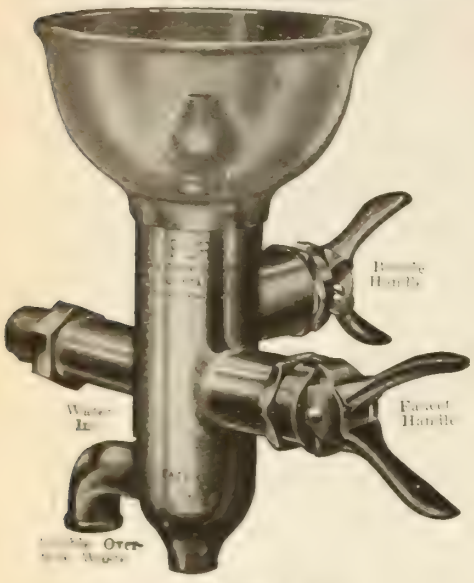
H. Mueller Mfg. Co., Limited

SARNIA, ONTARIO

Manufacturers of Waterworks, Gas and Plumbing Brass Goods and Jobbers of General Plumbing Supplies.

PURO

(MADE IN CANADA)



Actual Size 7 High.

Stop That Waste of Water

Did you ever stop to think how many gallons of water are wasted in the old-fashioned drinking fountain?

Did you ever see a child waste water?

Have you seen the old fashioned unsanitary drinking fountain in the Public Sign of pure water in your factory, office or store, installed.

Employees like it because it is clean—because it means a clean, fresh drink—because it saves time.

The Puro Sanitary Drinking Fountain has a porcelain receiving bowl which prevents spitting.

Puro is equipped with a self-closing push button and nothing else.

All water runs through the stem and office thermometer that saves dividends in real money in more energy and better workers.

Write us—tell us how many men you employ in your factories or departments.

We will send you a complete estimate on an installation for your factory, a special installation for your office or any one department.

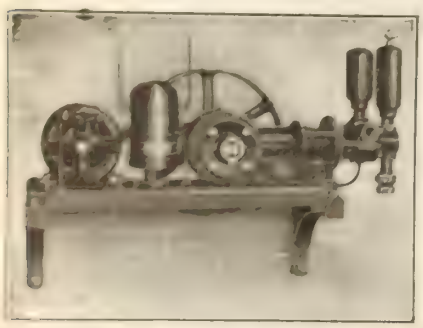
"PURO-FY" Your Water Supply

Puro Sanitary Drinking Fountain Company

SAFETY FIRST **PURO** ECON MY ALWAYS

147 University Ave. TORONTO, CAN.

The Paul Electric Motor Pump



Power pumps and power water supply write to the Fort Wayne Engineering & Mfg. Co., Dept. S., Fort Wayne, Indiana, and ask for Bulletin 607 which describes this pumping for residence service.

I have installed quite a number according to information received from reading your paper. Many questions which you answer are pretty much upon the same line in connection with sewage disposal, but the way some of your readers put the questions often brings differently-worded answers, all of which I find new interest in.

I happened to pick up a United States paper recently, which stated that the trunk line or main pipe with the cemented joints in connection with the absorption tile pipe should be reckoned in when calculating the number of feet of pipe to be used.

I am at a loss to know whether this is right or not. My reason for asking you is this:

If the cement jointed or main pipe is to be counted in, what would happen if the ground in which the pipes are laid was a long, narrow strip, and on account of the lay of the land, a long length of these tight-jointed pipes had to be used? There would be very few open-jointed pipes used. I don't see how this would do, and would, therefore, like your opinion on the matter. S. D., N.B.

We must confess to never having really mentioned this pnase of the subject re tile pipe absorption bed, and the pipe which should or should not be reckoned.

When referring, however, to the absorption pipe, it should be understood that tight-jointed pipes are **not** absorption pipe. For instance, let us suppose that a septic tank discharges 15 cubic feet of sewage at one operation every 24 hours. We would allow from 13 to 20 feet or so of field tile (open-jointed), according to the nature of the soil, to every cubic foot of discharge.

In no case should the trunk line be reckoned in, simply because they are absorption pipes.

It might, however, be well to state that these tight-jointed pipes should be limited to as short lengths as possible.—Editor.

NEW PATENTS

(Continued from page 23.)

angularity between said seat and said bowl is maintained while said seat is at rest.

4. A water closet comprising in combination, a bowl, and an auxiliary chamber, a seat superimposed on said bowl, arcuate rods fixed to said seat, extending into said chamber, and oscillitibly mounted therein at the radical center of said are, and means in connection with said rods whereby a predetermined angularity between said seat and said bowl is maintained while said seat is at rest, and means whereby said angularity of rest may be varied.

5. A water closet comprising in combination, a bowl, and an auxiliary chamber, a seat superimposed on said bowl, and arcuate rods fixed to said seat, extending into said chamber, and oscillatibly mounted therein, a nose at the inner ends of said rods, and a flush valve operating device in said chamber adapted to be tripped by said nose.

All previous prices on Enamelled Ware are hereby withdrawn, and the following List Prices go into effect to-day:

BATHS	4′	4½′	5′	5½′	6′
F. 71 "Stanley"	$22.50	$22.50	$22.50	$25.50	$37.50
F. 72 "Tuscan"	22.50	22.50	22.50	25.50	....
F. 73 "Douglas"	22.50	22.50	22.50	25.50	....

The above prices include crates.

LAVATORIES

G. 3225	$ 4.85
G. 3475	5.70

FLAT RIM SINKS

F. 400—18x24″	$ 4.50
F. 400—20x30″	5.60
F. 402—16x24″	4.25
F. 402—18x30″	4.65

ROLL RIM SINKS

F. 320—16x24″	$10.10
F. 320—18x30″	11.60
F. 320—20x30″	12.35
F. 321—16x24″	10.50
F. 321—18x30″	12.35
F. 321—20x30″	13.25

All other items of Enamelled Ware, not specifically mentioned in this notice, with the exceptions noted below, are hereby advanced 5%, i.e., 5% advance on prices ruling since January 8th, 1916:

Exceptions on which the 5% advance does not apply:

LAVATORIES

F. 139—17x20″, F. 169—18x21″, and all pedestal lavatories.
All laundry trays.
All sink and laundry tray combinations—Plate Nos. F. 351 to F. 370 inclusive.

TANKS

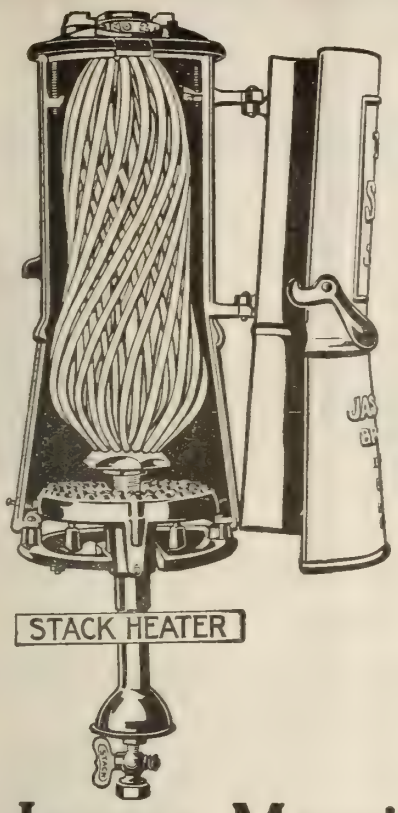
F. 585 and F. 586—Enamelled in and out with fittings.

All previous prices on our 3″ rim bath on base, plate F. 71½, are hereby withdrawn, and the following list prices are effective this date:

F. 71½, 3″ rim, on base—

4′	$30.00
4½′	30.75
5′	31.50
5½′	35.25
6′	48.40

Above prices include crates. Drillings either regular or bell supply. Usual terms and freight allowances. Prices subject to change without notice.



DURABILITY
Stack Gas Water Heaters

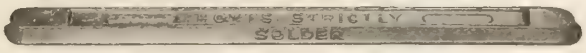
The STACK water heater has been on the market for over 10 years, and in that time has given absolutely no trouble. There is no point in heater where it is possible for sediment to lodge and form a coating between the heat and the water.

The absence of any lodged sediment makes it impossible for the STACK to burn out.

The rapidly moving heated water prevents the possibility of any stoppage.

James Morrison Brass Mfg. Co., Limited
93-97 Adelaide Street West, TORONTO

Our Mixed Metal Sales Amount to Over $5,000,000 Annually



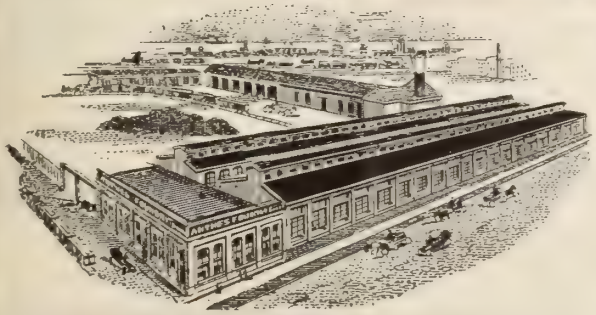
We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

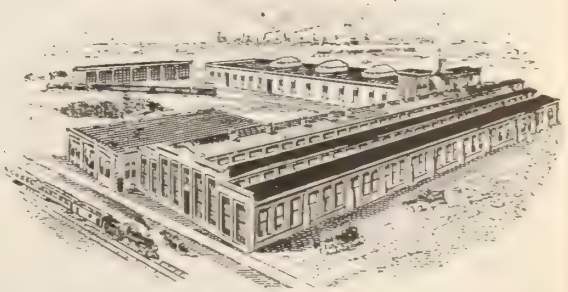
Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO
New York, N. Y.; London, Eng.; St. Louis, Mo.

TORONTO **ANTHES FOUNDRY LIMITED** WINNIPEG

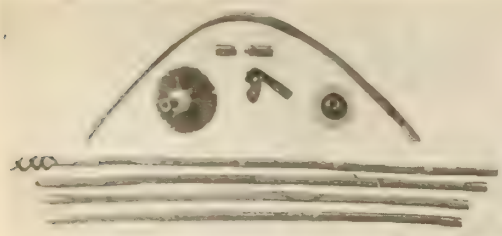


MANUFACTURERS OF
CAST IRON SOIL PIPE AND FITTINGS



DRAIN CLEANING MACHINE

As supplied to His Majesty's Government.



Made [illegible] of Malleable Case, Strong and Pliable Spiral with Jointed Scraper, Screw, Rubber Plunger and Bass Brush.

ROGERS AGENCIES, 84 Victoria St., Toronto

Condensed Advertisements

WANTED

WANTED — EXPERIENCED ESTIMATORS on Plumbing, Heating, Electrical and Sprinkler Work. Address Desk 1, The Sanitary Engineer. (7)

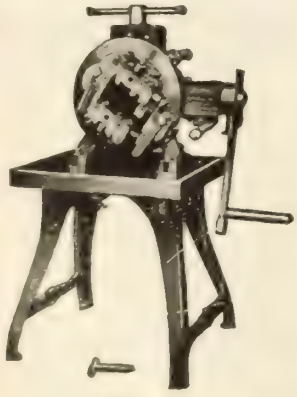
PLUMBERS AND GASFITTERS — PLUMBERS SUPPLIES — Will trade a fully modern 6-room house in Calgary for plumbing materials. No agents need reply. Price $3,400. Equity $1,800. Write Box 101, Sanitary Engineer. (9)

FOR SALE

PLUMBING, HEATING AND TINSMITHING business for sale in a growing town, Lincoln County, Ontario. Reply to Box 100, Sanitary Engineer. (6)

PLUMBING, HEATING AND TINSMITHING business for sale in a growing town, Lincoln County, Ontario. Reply to Box 100, Sanitary Engineer. (6)

FOR SALE — SECOND HAND PIPE THREADING and cutting machines. Two — No. 2 Machine Type Semi-Automatic Double Head Nipple and Pipe Threading Machine, ½-inch to 2-inch inclusive, complete with Countersunk Pulleys, etc. Two—New Rapid Upright Roller Pipe Cutters (MurcheyType), ½-inch to 2-inch inclusive. One—Heavy Duty Roller Pipe Cutter (Murchey Type), 1½-inch to 4-inch inclusive. One—No. 4 (Williams Type), Power Pipe Machine, 2½-inch to 8-inch inclusive, all complete. One—No. 12 Power Pipe Machine, 4-inch to 12-inch inclusive. Apply Box 102, Sanitary Engineer.



No. 00

PIPE MACHINES

Either Hand or Power

This machine cuts off and threads pipe from 1 in. to 4 in., right or left.

Threads Rods from ½ in. to 2 in., right or left.

American or Whitworth Threads.

Using the genuine Armstrong Dies.

All parts are interchangeable.

A time and labor saving machine.

Manufactured by

THE ARMSTRONG MFG. CO.

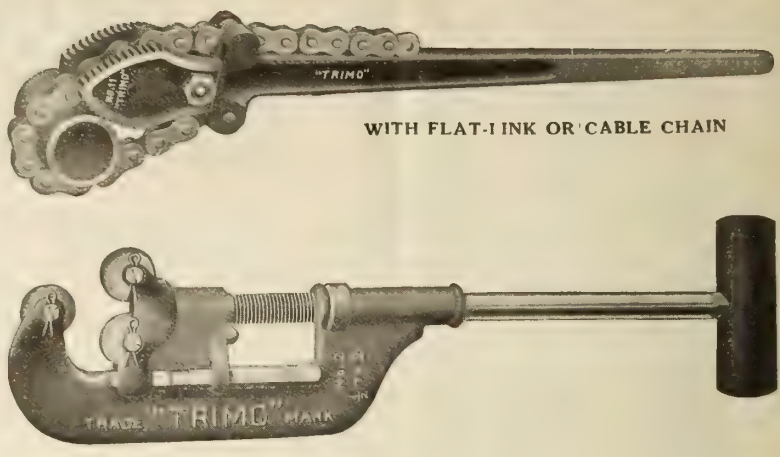
317 Knowlton Street

BRIDGEPORT, CONN.

WRITE FOR CATALOGUE

World-Famed Specimens of the Age of Steel

T R I M O



T O O L S

WITH FLAT-LINK OR CABLE CHAIN

Send for Catalog No. 91

MADE BY

TRIMONT MFG. CO., 55 Amory Street, Roxbury, Mass., U.S.A.

The Hotstream HEATS IN A HURRY TRADE MARK REG. WATER HEATER

The most complete line of high-grade tank heaters made in America. Capacity from 30 to 200 gallons.

Write for catalogue and calendar.

The Hotstream Heater Co. - Cleveland, Ohio

THE TINSMITH'S HELPER AND PATTERN BOOK

By H. K. Vosburgh — Revised by William Neubecker

This is a book of 135 pages, 54 plates. Epitome of mensuration. Mensuration of surfaces.

Tables, Rules and Recipes. Practical Receipts, on the making of all kinds of solder.

The Most Practical "Helper" Ever Introduced Into The Tinshop.

PRICE $1.00, Postage Prepaid.

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MACLEAN PUBLISHING CO., LIMITED

143-153 University Avenue, Toronto

WROUGHT PIPE

BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

Ask your jobber for Brand

CANADIAN TUBE & IRON CO., LIMITED
Montreal Works: Lachine Canal

The Honeywell Air-Seal Generator

Generates and maintains a predetermined pressure without the use of springs, valves, weights or mechanical parts.

Made entirely of cast iron and will last indefinitely.

Easy to connect and requires no attention after installing.

Write for complete catalog—it describes in detail the construction and operation of this simple and inexpensive pressure-creating device.

The Honeywell Heating Specialties Co.
Wabash, Indiana

Consulting Sanitary Engineer

Advice and Plans on
Water Supply and Sewage Disposal for Residences, Factories, etc.

H. L. SEYMOUR, B. A. Sc.,
A. M. Can. Soc. C. E.

BOX 95. SANITARY ENGINEER TORONTO

STOPPING your advertising to save money is like stopping the clock to save time.

Danger lurks in the hidden flaw of an untested chain

But not in the *tested chains* of "Vulcan" and "Agrippa" Chain Pipe Wrenches.

They are proven flawless

J. H. WILLIAMS & CO.
77 RICHARDS STREET BROOKLYN, N.Y. CITY
THE WRENCH PEOPLE

Western Office and Warehouse :
40 SO. CLINTON STREET CHICAGO, ILL.

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Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Brass Pipe and Tube.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Bubblers.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.

Cellar Drainers.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Penberthy Injector Co., Ltd., Windsor, Ont.

Chain Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

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Amherst Foundry Co., Amherst, N.S.
B. O. T. Manufacturing Co., Toronto.
Cluff Mfg. Co., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
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R. O. Wynne-Roberts, Toronto.

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H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

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C. A. Dunham Co., Ltd., Toronto.

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Steel & Radiation, Ltd., Toronto.

Drinking Fountains

Ejectors, Steam.
Kerr Engine Co., Walkerville.

Ejectors for Sewage

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Cluff Bros., Church St., Toronto.
James Morrison Brass Mfg. Co., Toronto.
Standard Ideal Mfg. Co., Ltd., Port Hope.

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National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

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Honeywell Heating Specialty Co., Montreal.
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National Equipment Co., Ltd., Toronto.

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Canadian Wolverine Co., Ltd., Chatham.

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Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.

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James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Warden King, Ltd., Montreal.

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Trimont Mfg. Co., Roxbury, Mass.

Pipe Joint Compounds.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

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Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Warden King, Ltd., Montreal.

Pipe Threading Tools and Machinery.
Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.
A. B. Jardine & Co., Hespeler.

Pipe Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Porcelain Ware.
Amherst Foundry Co., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Pumps.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Cluff Bros., Church St., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

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Steel & Radiation, Ltd., Toronto.
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Darling Bros., Ltd., Montreal.
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Vitro Tanks
Cluff Mfg. Co., Toronto.

Vacuum Systems of Heating.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Water Supply Systems.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Darling Bros., Ltd., Montreal.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

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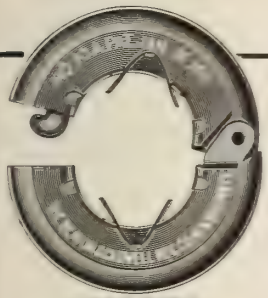
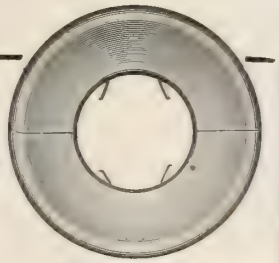


OPEN VIEW NO. 10-A.

The CEILING PLATE that's better



TOP VIEW NO. 10-A.

THE NO. 10—A NARROW FLANGE PLATE IS A STEEL HINGED PLATE. FLANGES ¾" WIDE. HIGHLY FINISHED. ESPECIALLY DESIGNED FOR TWIN CONNECTION "NARROW."

The split ceiling plate is coming more and more into use than ever and ALWAYS GIVES A NICE FINISH, because it can be attached to mains and risers at the very last, and is not exposed during completion of a building on the floors.

High quality at the right price.

Gem No. 4.

Gem No. 4 Automatic Air Valve

Made from the best brass obtainable. Pressed shell and pressed brass base which eliminate danger from blowholes, which is a fault with cast bases.

Write for catalog showing our complete line of specialties.

The BEATON & CADWELL MANUFACTURING Co.

New Britain, Conn.

Eastern Agent: J. R. Devereux & Co., 233 St. James Street, Montreal. Western Agent: A. E. Hinds & Co., Chamber of Commerce, Winnipeg.

Makes any Tank Heater Automatic for $35.00

Handsome Profits to Plumbers

We take pleasure in announcing that the Jarvis Thermostat has been further perfected and can now be used to control any style of tank heater.

The perfection of a low-priced snap-action thermostat, has made it possible to supply an inexpensive and [illegible] water heating system. Something we have been able to do only recently.

The Thermostat

The Jarvis Thermostat is the latest and most perfect of snap-action thermostats. It is installed on the water supply from the boiler to the heater, automatically regulating the supply of gas to heat the water drawn. Turns the gas on, shuts it off again. The water can be supplied at whatever temperature desired. Sufficient supply is kept in the boiler for instant use.

The Covering on the Boiler

Mineral Wool Covering installed on boiler does away with practically all loss of heat by radiation. It is a special covering for that purpose.

Hot Water Supply

There is always enough hot water on hand to supply one bath, and while this is being drawn, more water is being heated, keeping a constant supply always at your service.

Reprinted from Gas News, Toronto.

Jarvis Gas Heater Co.
114 Adelaide St. W., Toronto

float-controlled, quick-opening and closing valve.

TRADE PENBERTHY MARK

Automatic Cellar Drainer

Specially adapted for use in pits, sumps, cellars, tanks, settling basins or whatever it is desired to keep water or other liquids from going above a certain level.

SIMPLE—COMPACT—ECONOMICAL.

FAR superior to any other device of its kind on the market.

Some Advantages

1. All parts except the float are above the water, no slime or corrosion to contend with.
2. The operating valves open and close instantly by action of the water pressure.
3. It is compact, taking up less than half the space of others, and weighs less, for the same capacity.
4. It costs less than many other drainers not as efficient.

Protect yourself from the damages of Spring floods and rains,

Install the Penberthy Cellar Drainer

STOCKED BY LEADING WHOLESALE PLUMBING HOUSES IN CANADA

Interesting Booklet on Request.

MANUFACTURED BY

PENBERTHY INJECTOR CO., LIMITED

WINDSOR, ONTARIO

DART

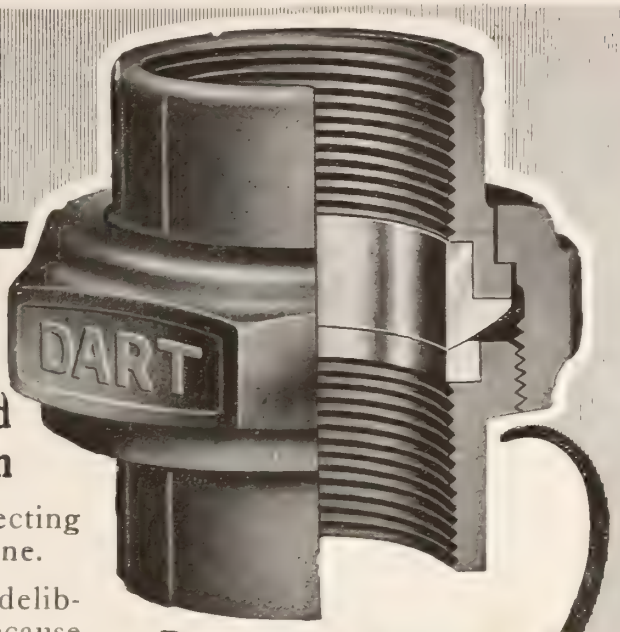
Unions

save you time and labor and make permanent satisfaction

The ball-shaped joint makes connecting easy, whether pipes are in or out of line.

The Dart Union never leaks until deliberately loosened with a wrench, because there is no deterioration at the joint and the heavy iron parts withstand all stress.

All Jobbers sell them.



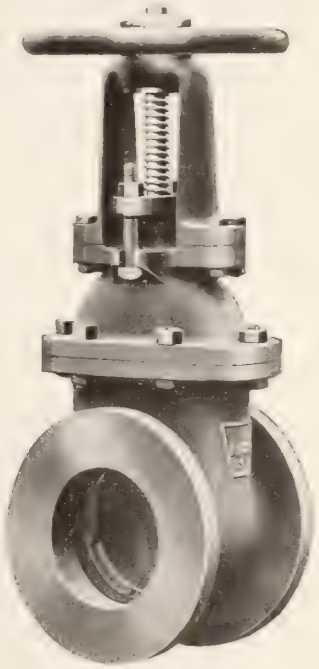
Bronze to Bronze
at the joint

Manufactured by
DART UNION CO., LIMITED
TORONTO

There Are Lots of Gate Valves

advertised and sold, but not all of them possess that neat appearance, combined with strength and stability, which characterizes

KERR IRON BODY GATE VALVES



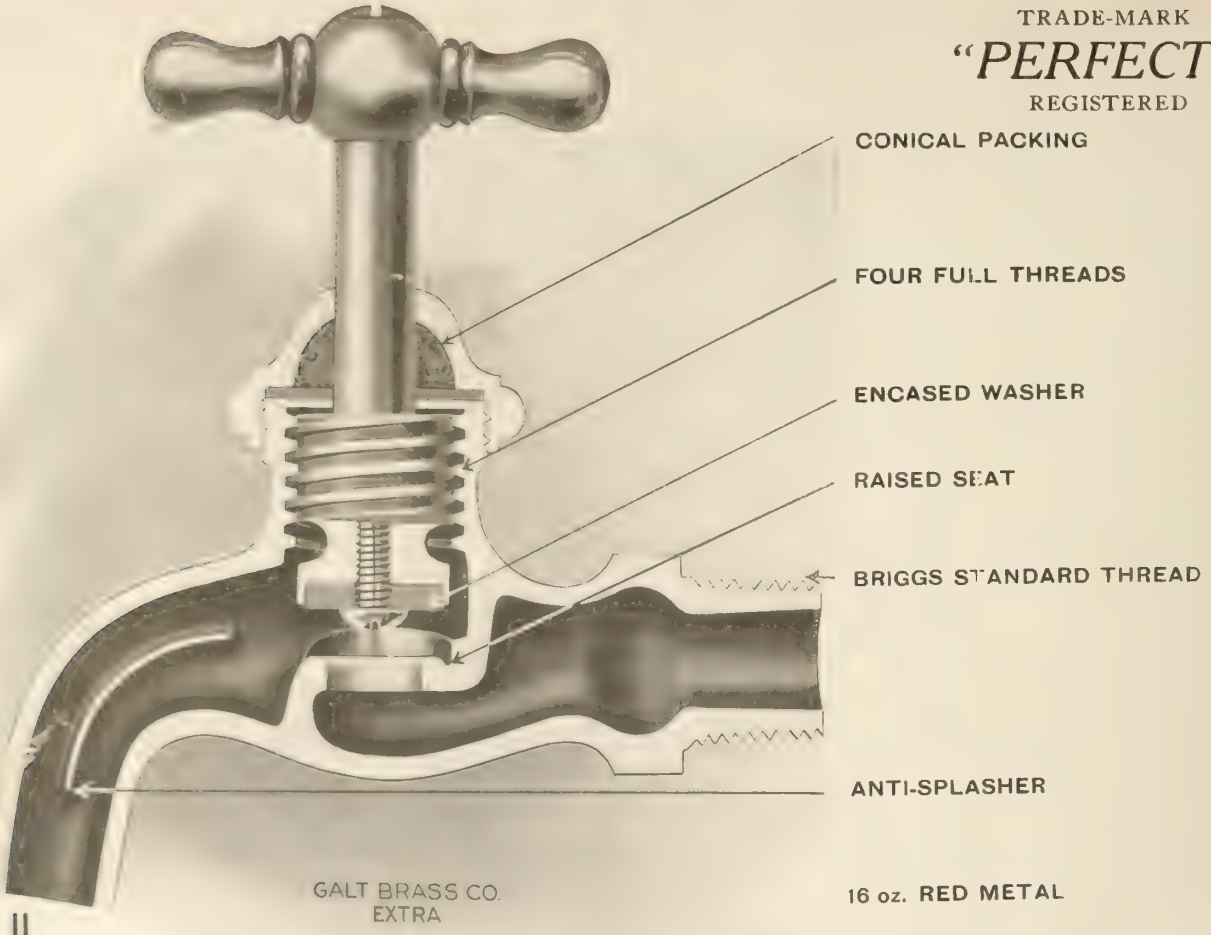
Specify KERR'S (KEYSTONE) Iron Body Gate Valves on your next order, and let us prove what we claim for them.

Our Catalogue No. 5 tells all about them. It is yours for the asking. Write us to-day.

Approved by the Fire Underwriters Association, and Registered by Boiler Inspection Departments of Ontario, Saskatchewan and Alberta.

THE KERR ENGINE COMPANY, LIMITED - Walkerville, Ontario

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

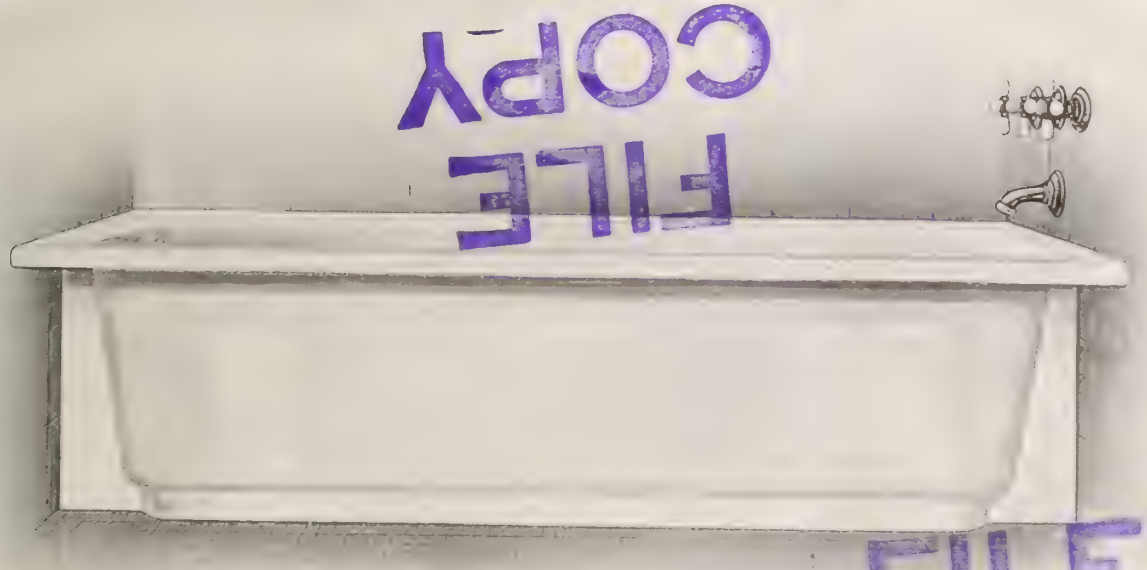
THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol X. Publication Office: TORONTO, MAY 1, 1916 No. 9

Enameled All-over

VICTOR ONE-PIECE BATH

Enameled Inside



COPY FILE

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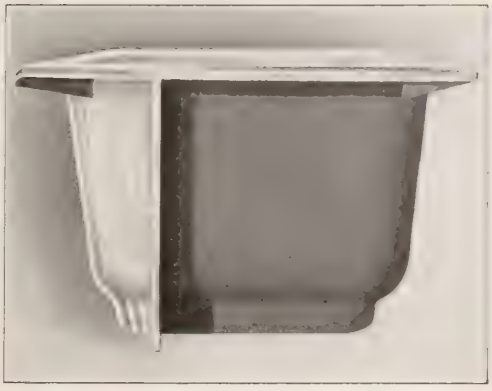
The principle of the Victor Bath is a tub body cast integral with a Base and Wing Plates: the latter in various positions on the Tub Body to make the various Combinations, viz.:



Open Type
Corner Type
Recess Type
End to Wall Type
Back to Wall Type
Also with Extension Rim at End or Back for fittings—thru rim.

PRICES ON REQUEST

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General Offices and Factories: Port Hope, Canada

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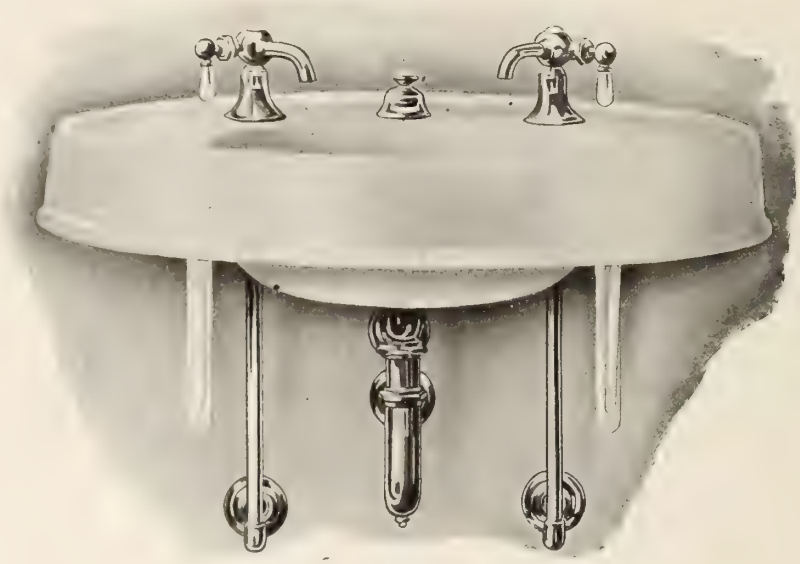
Beaver Brand

Cast Iron Enameled Ware



This is only one of the many attractive styles of Beaver Brand Basins. All have that pure whiteness of color which makes them a favorite among the people.

A sample will convince you of their durability and finish, which is second to none.

Ask your jobber for BEAVER BRAND CAST IRON ENAMEL WARE
and build up your reputation

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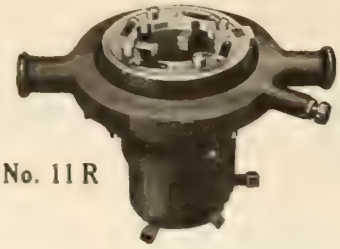

No. 11 R

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Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely enclosed, excluding chips and dirt.

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Saving 80 Bbls. of pure hot water every 24 hours

Out in Aberdeen, South Dakota, where blizzards rage and the thermometer hovers around 40 degrees below, is one of the several thousand remarkable installations of the

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"We save in fuel about $2,000 annually."

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The truth of the matter is, you and I are going to sell more Burnhams.

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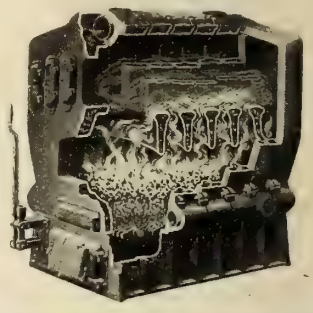

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(Made in Canada)

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OPEN VIEW NO. 10-A.

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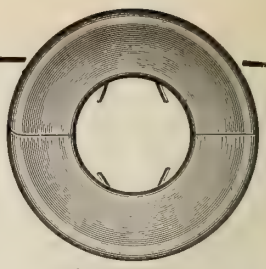

TOP VIEW NO. 10-A.

THE NO. 10—A NARROW FLANGE PLATE IS A STEEL HINGED PLATE. FLANGES ¾" WIDE. HIGHLY FINISHED. ESPECIALLY DESIGNED FOR TWIN CONNECTION "NARROW."

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The split ceiling plate is coming more and more into use than ever and ALWAYS GIVES A NICE FINISH, because it can be attached to mains and risers at the very last, and is not exposed during completion of a building on the floors.

High quality at the right price.

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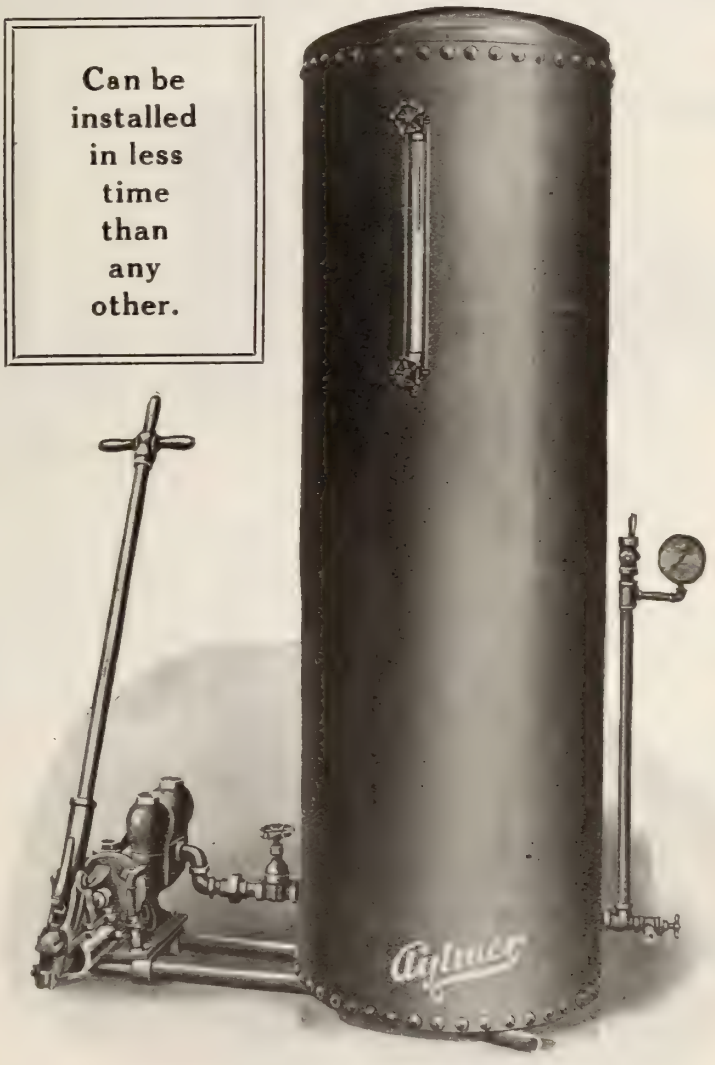
Ask us for list of prominent customers who prefer the Aylmer 520 System.

Can be installed in less time than any other.



Write to-day for Price List No. 18, and then order one for your next job.

Figure H. 520. Aylmer Standard System with Adjustable Base for Tank and Pump.
PUMP WITH INDEPENDENT AIR COMPRESSOR.

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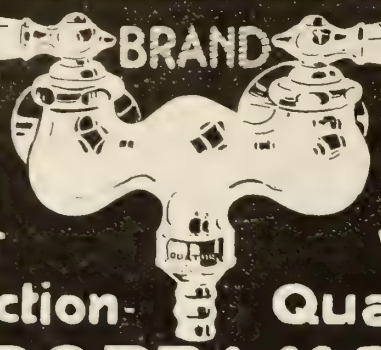

Highest Quality
Beautiful Design
All Working Parts of
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Has Interchangeable Bronze Seat
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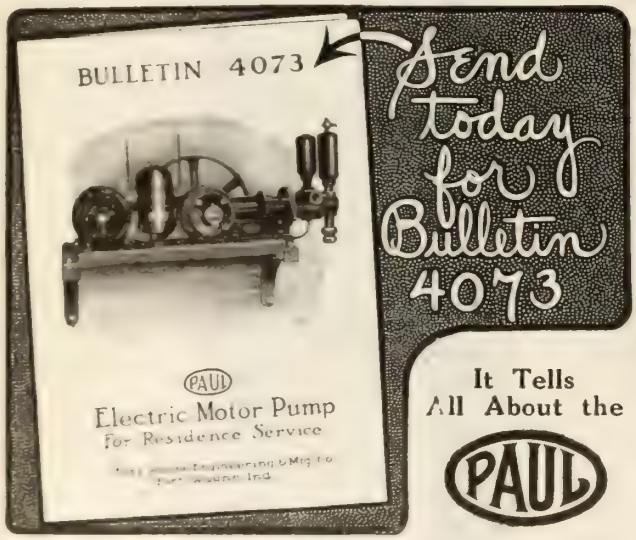

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Main Office and Factory: Fort Wayne, Indiana
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HOT WATER HEATING JOB

by using a

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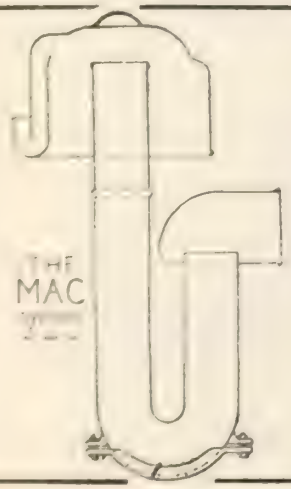
The SAVING in PIPE, FITTINGS and LABOR is where you accomplish this, and say, don't you think it would be a mighty good BOOSTER to your reputation as a fitter.

MADE IN CANADA ONLY

THE W. E. CLARK COMPANY

28 Adelaide Street West, TORONTO



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Cor. of Mulock and Junction West Toronto

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Mr. Mansell is one of the best known sanitary engineers in Canada, and is one of the firm of Purdy, Mansell Co., Ltd.

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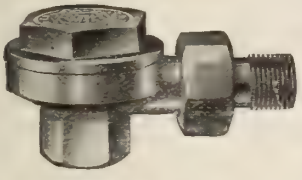
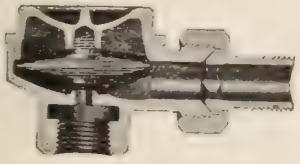
The DUNHAM VAPOR HEATING SYSTEM

At a low, safe pressure, ounces in fact, gives that mild, even heat without noise or pounding in pipes and without the possible chance of freeze-up troubles.

Simply obtained through the use of Dunham Radiator Traps and Dunham Packless Inlet Valves on the Radiator.





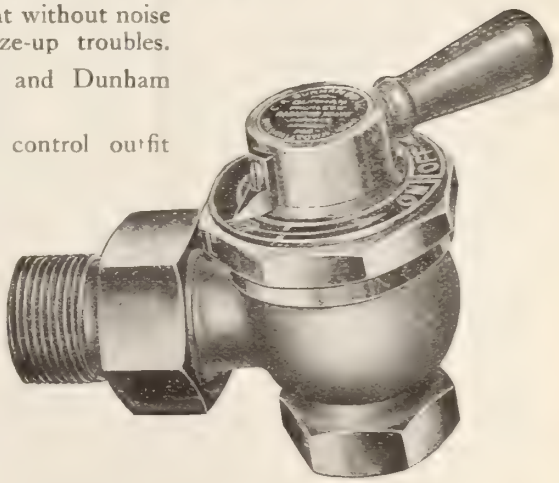
Dunham Radiator Trap

Dunham temperature and pressure control outfit takes care of the regulation.

No air binding and no air valves on the radiator.

All attachments are as simple as the operation of the system. Easily installed and guaranteed lasting satisfaction.

Let us send you "Information Bulletin" and No. 11. You would perhaps be interested in receiving copy of consumers booklets the "3 H's." **Write to-day.**



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SANITARY ENGINEER

PLUMBER AND STEAMFITTER OF CANADA

Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, MAY 1, 1916 No. 9

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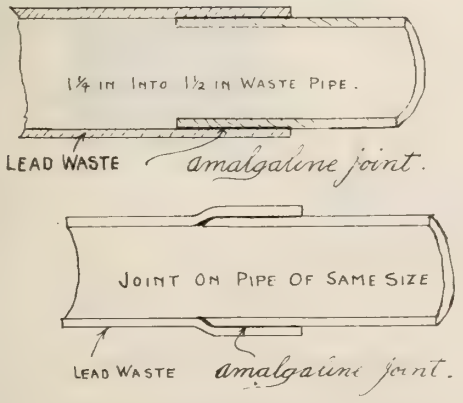

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"The Scientific Jointer"

Waste pipes can be joined in the most awkward places. All that is required is clean and well-fitting joints, a small amount of amalgaline ribbon and heat applied with a small torch.

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STOP and think—how many families you actually *know* need a Laundry Heater? How many do you *know* have Summer Cottages, which ought to be supplied with a small Heater? How many Greenhouses and Garages do you know of which ought to have Heaters? *Make a list of prospects* and it will surprise you how many you know of. Send this list to us—we will mail them literature about our

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No. 112

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We want Agents—the Kind We Can Help—Write us for particulars of our lines of Boilers, Radiators, Heaters, Steam Heating Equipment, etc.

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AGENCIES IN ALL LEADING CITIES

THE SANITARY ENGINEER

VOL. X. MAY 1, 1916 No. 8

The Connection of Knowledge

Become a Salesman. Know Your Goods—Show the Service You Can be to the Public if Given the Opportunity—The Force of the Appeal to the Eye—Utilize Your Windows to the Best Advantage

BY G. E. PEARSON

"DO you know why some preachers make converts and some skepticism?" asked my sanitary engineer friend.

"No."

"Well, I'll tell you. Because the former are salesmen and the latter merely preachers. Of course they don't have order books because their goods are automatically delivered when the sale is made."

He deals in ideas of religious value, we deal in ideas of commercial value. The principle's the same. He talks love instead of sanitation and takes faith instead of cash. And the reason a good preacher is a good salesman is because he knows the goods he sells. And that is the lesson of the day: Know your goods as a good preacher knows his and you can't help but makes sales as he does.

When he goes out to rake in a little Faith he talks Love and Hope and Charity and doesn't allow himself to be sidetracked on to Hate, Despair or Misery, except just as side lines. He knows his products up and down and cross ways, and thinks them morning, noon and night without even a let up and that's just what a sanitary and heating engineer must do.

And he believes in his goods as well: thinks they are the best of their kind in the world and that people simply must have them—as all sanitary and heating engineers should know and believe.

As a Man Thinks, So He Is

As a man thinks, so he is. If you really get down to it and think sanitation, your thoughts will color your words and deeds. You'll become a positive magnet that will attract business to you, you'll soak business up from people and books.

Enthusiasm will ooze out of you at every pore and come back, like a snow ball that has run down hill, many times magnified.

One Thing at a Time

And when the preacher is out selling his goods he is careful not to confuse his customers' minds with a great variety of goods: he says one thing at a time, and pounds away at it for all it is worth. He does not wander all over the map and make it difficult to know what he's driving at, instead of making up his mind just what it was that customer needed and was willing to pay for and hammering away on that? The one method creates indicision instead of giving impetus to decision. That's what I mean by saying a good preacher sells only one thing at a time.

Stand and Deliver!

He depends upon arresting the people's attention by some striking saying, something that will hold their minds while he drives his argument home. We can do the same thing to-day with such an example. Catch your customer's eye or ear with something arresting and then pour the hot stuff into him. Become a merchant sanitary and heating engineer.

The eye is best, though. I wonder how many men stop to think why it is that a window display is such a sales getter. Why not the mere statement of the fact that one has such and such goods and this price or that?

Using Natural Laws

It's because the sense of sight is the most receptive and most easily impressed of all our senses. And this fact is played upon and cultivated by all industries. Consider the movies, or women's clothes, or spectacles of marching troops to aid recruiting. All eye work.

It's because only about one man in fifty is a university man; one in ten a high school graduate; and because the remainder have been eye-educated, soaked up what education they have more through their vision than by any high brow means. And that's why a window's good, Mr. Sanitary Engineer.

An Arresting Window

I remember the application a friend of mine made of this idea. He had a dead stock of kitchen hardware on hand that neither love nor money seemed able to move including a prominent featuring in the window. Well, he got busy, made a window that made people "sit up and take notice." There were big dish pans trimmed with rows of small granite cups and spoons and odds and ends, whole rows of them and smart little tin pails trimmed with egg beaters for aigrettes. A woman's hat looks a good deal like a drunken sailor anyhow nowadays; a man can make anything and call it a hat and it will go down.

The whole town talked of it as a seven-days' wonder. That dead stock walked off as though it had legs. There were more people in the store asking for kitchen ware than was ever known before.

Advertising for the Eye

The same idea is played up by the biggest industrial concerns of the country, who are spending hundreds of thousands annually for advertising space. They study their clientele and dope out stuff in proportion to the powers of absorption of the class they are trying to reach. Consider their ads. One-half to three-quarter of the valuable space that they pay for in big round iron men is given over to the illustration of some idea that is frequently only distantly related to the product at hand. The idea is to arrest and hold the attention with the part of the ad., so as to drive home the argument with the remainder. And that's what a sanitary engineer should do in his window. Have the proposition, the sales talk there, but don't depend upon it to draw the crowd. It's too practical. Have something else to do that: something strange, bizarre, unique and then slip in the argument that makes the sale.

So you see even the Bible and its preachers may be used to advantage by all live energetic sanitary engineers.

Business Going A-begging

A Straight Talk From the Editor as a Result of a Trip Through a Number of Country Towns—Better Spend Time Looking for Country Work, Than Tendering on Cut Price Jobs From an Architect's

For several weeks I have been visiting small country towns throughout eastern and western Ontario, and have been agreeably surprised to note the optimistic spirit which prevails amongst the country people, resident, merchant and farmer alike.

The two former, like the city dweller are optimistic, because the farmers' outlook appears to be bright. The farmer remarks that life on the farm is beginning to be worth while, and that prices are more favorable, and that these heavy falls of snow are like "white gold" to him, he feels good, and is to-day a better business proposition than ever in the history of Canada.

In a restaurant situated in a town of 1500 population, a number of farmers were having dinner, I got into conversation with two of them and their wives. From one thing to another the conversation drifted to "Sanitation on the Farm" I put several questions to these people and found that neither had sanitary fixtures in their homes.

It was surprising to note how ready a hearing I got on the subject, I finally took their addresses and handed them into a nearby sanitary engineer, and told him I could make two sales, that if he handled them right, he could do the same.

The question is that of salesmanship, the ability to show these people in the country that they need better and more sanitary conditions in their homes.

I remember well hearing a lecture on salesmanship, the lecturer related the story of a would be salesman who upon being asked if he had sold any of his goods to a certain merchant, replied, "No I've never been able to land an order from him, I've called on him for over two years and have tried my best to sell him a bill of goods."

The person who asked the question said, "I believe you have tried hard to sell goods to him," but that's where you have failed to get the business, "my friend, you do not know the first qualifications necessary to the make-up of a successful salesman."

"Your first duty is to know, from the purchaser's standpoint why he should buy. You must show, and convince your prospective customer why and how he can reap a benefit by acquiring the goods you have for sale."

WANT BETTER SANITARY SYSTEM

A deputation from the Board of Education waited on the town council at their last meeting asking that a sewer be dug on Bridge street from the schools to the river.

For a long time it has been felt that the present sanitary system was inadequate and since the new property was bought for the accommodation of the primary classes the need has become far more apparent. There is no doubt that poor sanitation is conducive to disease and it is a fact that the sanitary system that we have at present especially in the small school is extremely dangerous to the health of the pupils.

Under these circumstances that proper means should be taken to relieve the situation is imperative. There are between 600 and 700 pupils in attendance at the schools and the schools must be made healthful. This is not only demanded by law but it is in the interest of the community.

We have little doubt that the town council will undertake the proposition and take immediate steps to provide for proper sanitation. Whether it is necessary to have a complete survey made before the work can be accomplished, we cannot say, but if this is demanded by the Health Act the necessity of the case is not altered. The children's health is all important and the duty of those entrusted with public affairs is to see that proper sanitary conditions prevail in our schools, as well as in private houses.

Reprinted from the Campbellford Herald.

Too many men are there, who have the wrong perspective, they are trying too hard to sell goods, and are putting their energy into the work of getting rid of goods.

It is the same with the farmer. If the agricultural implement salesman could not show and convince the farmer that he could save money, make more money, and at a less labor cost that salesman would never make a sale. He lays more importance on showing the farmer all the points which are beneficial to the purchaser and proves conclusively that by not acquiring this or that reaper, binder, harrow, etc., that he, the farmer is the biggest loser, and then comes the sale of one of the machines.

Now, why should not sanitary and heating engineers do likewise, no farm implement can be of as lasting a service residents in the country, from the baby at birth to the old folk who have ceased to follow the plough, as can the appliances furnished and installed by the sanitary and heating engineer.

These appliances furnish an every day need, winter and summer rain or shine.

Farm implements assist only in earning money, and are only on an average in use a few weeks each year, while sanitary and heating appliances are in use all the time night and day, and, make the home life worth living, make money worth the earning.

The clipping from the Campbellford Herald speaks for itself. It proves that sanitation and sanitary conveniences are becoming more and more necessary in the country schools. The town of Brighton and district with a population of upward of 2000 have and are now equipping a splendid school costing about $55,000. The most up-to-date sanitary conveniences are being installed, including heating, ventilation and stationary vacuum cleaner, and a splendid sewage disposal plant which requires over 7,000 lineal feet of field tile, along with all other appliances necessary to make the school as modern as possible.

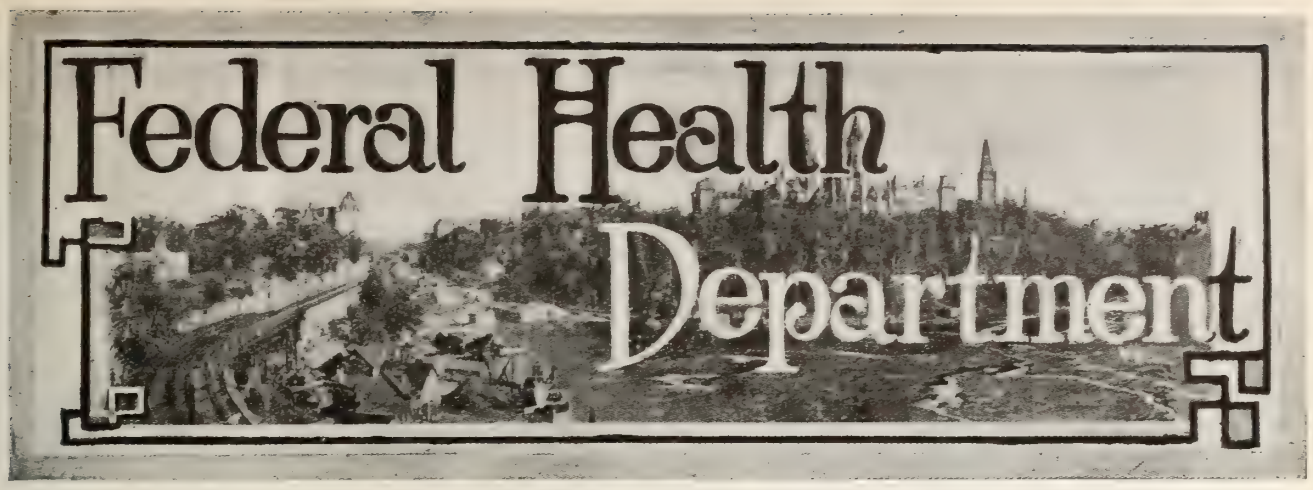
Now, such a building is bound to create a desire on the part of the pupils attending it, to have sanitary appliances at home, and the influence brought to bear upon parents cannot fail to create a desire, too, for a modern bathroom and kitchen in the home. Therefore it is up to the sanitary and heating engineer to be ready and on the lookout for such business, which without doubt will soon be "going-a-begging".

U.S. STEEL AND CANADA

The report that the United States Steel Corporation was about to make a large appropriation for the building of a plant on its Canadian property is again revived. It has cropped up from time to time for a good many years back, and when the steel business was looking rather ragged, it was a bogey of some influence on the nerves of the Canadian steel stocks.

Just now, with the Canadian mills operating to capacity and turning away business, the prospect can be viewed philosophically and time taken to decide whether this report of early construction is to pass into oblivion like the others.

The plausible side to the story this time is that with the talk now current in London of closer trade relations between the Mother Country and the Colonies after the war, the U.S. Steel Corporation may consider that the psychological moment to enter Canada has arrived.



There is no constitutional objection to the establishment of a department of public health, but the question will arise, if such a department should be established, with what subjects connected with public health that department should deal, so that it will not intrench upon what, by practice, has fallen under the jurisdiction of the different provinces, and before any such health department is established, it would be most desirable to consult the different Provincial Governments so that no action may be taken that would be regarded as trespassing upon the jurisdiction of the provinces, and upon the work which they feel it is their duty to undertake. As the constitutional question involves considerable interest, I have had prepared a statement dealing with what this Dominion has done since Confederation with regard to matters of public health. I find that by chapter 67 of the Revised Statutes of Canada, which created the Department of Agriculture in 1868, immediately after Confederation, the subjects of public health and quarantine were placed under its administration. It is laid down in chapter 74 of the Revised Statutes of Canada that the administration of quarantine pertains solely to the Dominion Government, so that the precedents established under the British North America Act would lead us to the conclusion that there are certain subjects relating to public health that come exclusively within the jurisdiction of the Dominion, and that there are others as to which there is equal control by the Dominion and by the provinces.

Until 1872 the Quarantine Act contained provisions charging the Department of Agriculture with the administration of public health, there having been under that department a public health medical board, of which the late Dr. Tache, deputy minister of Agriculture, was the secretary. In 1872, however, the then Minister of Agriculture, the late Hon. J. H. Pope, advised the elimination of the public health clauses from the Quarantine Act, because he found that heavy accounts for public health service were presented to him for payment by the provinces while he had no control of appointment or, in the direction of the service which had gradually become provincial. The then premier, Sir John A. Macdonald, concurred in this view, and the Quarantine Act was amended by the elimination of the directory administrative clauses pertaining to public health. The Government of Mr. Mackenzie, which succeeded to office (in 1873) strictly carried out this policy, and did away with the Health Statistical Office at Halifax, which had been retained by the previous Government.

In 1878, on the return of the ministry of Sir John A. Macdonald to power, Mr. Pope again becoming Minister of Agriculture, on the very earnest representation of Dr. Tache, the subject of leprosy within the Dominion—which belongs to public health and to which Dr. Tache had devoted special study on a reference from the Imperial authorities—was again taken over as part of the administration of the department. For many years there has existed in the county of Gloucester in the province of New Brunswick, and, I believe, to a slight extent in some portions of Nova Scotia, the disease of leprosy, and before Confederation the province of New Brunswick maintained at Tracadie in the county of Gloucester a lazaretto, all the expenses of which were paid by the province. That continued for a short period after Confederation, and then the expenses were borne by the Dominion Government, I believe that the lazaretto was again taken over by the province, but, in 1878, I find that an arrangement was made with the province of New Brunswick by which the lazaretto at Tracadie was transferred to the Dominion Government, and it has since been administered through the Department of Agriculture. That lazaretto, I may say, has done very excellent work; it has been well managed and well maintained, and the disease with which it is especially intended to cope is gradually though slowly being eradicated. In addition to this, the Dominion Government from time to time has taken action in isolated cases of leprosy reported within the Dominion and, in late years, more particularly amongst the Chinese in the province of British Columbia.

Under the Canada Shipping Act the care of sick sailors pertains strictly to the subject of public health, and was formerly under the administration of the Department of Agriculture. It is now administered, as hon. gentlemen know, by the Department of Marine and Fisheries, to which it was transferred in virtue of an understanding between the then ministers of the respective departments, the Hon. Mr. Pope and the late Hon. Peter Mitchell. It may further be stated that the practice of the Dominion Government since Confederation has been to take votes for both public health and quarantine.

To sum up, I may say that the administration in all matters pertaining to quarantine, that is, the dealing with any infectious disease, on its presenting itself at any of the ports of the Dominion, maritime or inland, is vested solely in the Dominion Government; while it is contended that all other matters pertaining to public health are joint between the Dominion and the provinces, in virtue of the provisions of the British North America Act.

There is a Dominion Public Works Health Act, under which sanitary arrangements and matters of that sort in connection with the construction of public works are attended to throughout Canada by the Department of Agriculture.

Having said that much in a general way with regard to the powers of the provinces and of the Dominion with respect to this very important subject brought to the attention of the House

by the hon. member for South Perth (Mr. Steele); I may say that we are all aware that the question of public health is daily assuming greater importance in this country. It has become a distinct subject and branch of study in technical universities throughout the land, and to such an extent is this the case, and it is so recognized, as a distinct branch of medical science, that special degrees in public health are given by some of our universities, including, I believe, the University of McGill, and men who have graduated in public health from these institutions are in some cases acting as health officers in different cities of Canada, having been appointed to such positions by virtue of legislation passed by the Provincial Legislatures.

The subject is considered to be of so much importance that the man with the ordinary diploma of M.D. from any university is not regarded as being qualified to deal with the question of public health which being now looked upon as a special branch of science, special degrees are conferred after courses of study.

The progress of hygiene and preventive medicine known under the name of "Public Health" has been rapid and marked, especially during the last few years, and there has undoubtedly been an increasing demand for governmental regulation. In the United States the marine hospital service has been by Act of Congress enlarged into a public health service. There are already departments of public health, I am informed, in some of the sister colonies. There has been discussion about the matter in England, but I do not think the movement for the appointment of a Minister of Public Health, which was very active a few years ago, has been discussed recently, all other subjects, of course, having been made secondary to the problem of the war. The medical profession of Canada speaking through the Canadian Medical Association, has urged the importance of the establishment of a Department of Public Health. The object of the creation of such a department by the Dominion Government, having in view all the subjects related to the public health with which the Government deals at the present time would, it seems to me, to be consolidate with a view to efficiency and economy in those matters concerning public health and sanitation which are already within the jurisdiction of the Government, but which are now scattered among the different departments. The question of adding to the duties of a department of public health other matters such as now fall within the realm of provincial legislatures, and which they have been industriously and energetically in many cases giving their attention for years past, will have to be considered carefully, and there would have to be conferences on the subject between the Dominion and the provinces. The establishment of such a department, it is contended, would obviate the confusion and extra correspondence often caused by the want of knowledge of the jurisdiction of the Minister of Agriculture in public health matters, and would facilitate the business of those who come to the capital in connection with the various sanitary matters now divided up amongst the different offices of the Government, many of them under the direction of non-medical heads, who have little knowledge of medical or sanitary science. That would be a matter of internal domestic consolidation within the Dominion Government itself. It would be a governmental recognition of the importance of public health, and of the authority of such a department to issue rules and regulations on the subject. The experience of the Department of Agriculture, I am informed by its permanent officials, as well as the example of other countries, leads them to believe that such publication so issued would carry much more weight than similar publications issued in the name of any other department.

It may surprise the House to know how many matters affecting public health are dealt with by this Government at the present time. These subjects are now scattered over several departments, without co-ordination or homogeneous supervision, and might well be grouped together in a department of public health:

In the Department of Agriculture:

1. Sanitary advice to Dominion Government.
2. Quarantine (maritime and frontier).
3. Leprosy throughout the Dominion.
4. Public Works Health Act.
5. The sanitary part of the census.
6. Vital statistics (Dominion).
7. Health of animals.
8. Inspection of meats and canneries, and factories of foods generally.

In the Department of Inland Revenue:

9. Adulteration of foods and drugs.

In the Department of the Interior:

10. The sanitary and medical side of immigration affairs.
11. The sanitary and medical side of Indian affairs.

In the Department of Marine and Fisheries:

12. Sick seamen and marine hospitals. Also
13. Supervision of sanitary measures and sanitary police in the Territories which have no organization corresponding to a Provincial Board of Health.
14. National bacteriological laboratory.

A department of public health could be equipped with a national bacteriological laboratory, as is the case in other countries. Such a laboratory could report promptly on suspected specimens of micro-organisms from vessels, trains, etc., held under quarantine of observation. The quality and purity of the various protective and curative agents, such as vaccine, tuberculine, Haffkine's prophylactic plague fluid, and the diphtheria, typhoid, anthrax, etc., are of the utmost importance to the public health and to the well being of the country. It is suggested that the manufacture of these protective and curative agents might be carried on by salaried officials in the national laboratory, and the issue of them could be under the supervision and direction of the proposed public health department. In this way, it is claimed, the maximum protection of the people of Canada in this matter can alone be attained and that confidence secured which will induce the people to properly avail themselves of these all-important means of protection from epidemic and infectious disease. It is also contended that in such a national laboratory there might well be bacteriologists and chemists engaged in original research. This country would thus rise above the position of hanging on to the skirts of other nations and waiting to hear from them of the progress made in these important lines of science. Other people have suggested additional subjects that might be included if a department of public health is established. After conferences with the various provinces, the following might be included:

15. Sanitary direction of the service of protection of international waterways—a most important subject.
16. Sanitary supervision of the protection of the public health against tuberculosis, a subject that is being dealt with on a large scale by several of the provinces.
17. Smallpox and vaccination.

That, I understand, is already dealt with by the Dominion Government. In case of a smallpox epidemic along the border, the Dominion Government takes means to see to it that the people are vaccinated and the spread of the disease prevented while the local authorities take steps to quarantine the disease in the different cities and towns and to isolate people who have contracted the disease.

18. Railroad, car and steamboat sanitation, a most important matter—to see to the disinfection of cars, and public conveyances, in order to assure the exclusion of malignant microbes so that

disease may not be spread by those who travel.

There is already an official of the Government known as the Director General of Public Health and Sanitary Adviser of the Dominion Government, with the rank of deputy minister. But, up to the present, the matters I have enumerated have been left scattered through the different departments and not collected under the control of a specially qualified officer. I presume that their union, co-ordination and development would naturally follow the creation of such a department.

As I said at the outset, I regret that the Minister of Agriculture (Mr. Burrell) is not here, because I know that in the last few years he has given a great deal of thought and study to this very important subject. My hon. friend from South Perth (Mr. Steele) has undoubtedly accomplished a good work in bringing this matter to the attention of the House. It will no doubt attract attention throughout the country, and will cause the public to give consideration to this important matter. And, while, at the present moment, our thoughts are taken up with the war now being waged, and upon which our liberties and the institutions of our country depend, to the exclusion of practically every other subject, yet I think that all will agree that the time occupied by the House this afternoon in a discussion of this matter, so well brought to our attention by the hon. member for South Perth, is time not wasted. I would suggest to my hon. friend that it would not be desirable to cause the resolution to be pressed to a vote this afternoon. I can assure him that the matter will receive, as it has received, the best thought and attention of the Government. I am sure that when the Minister of Agriculture is once more restored to health and able to deal with the work of his department he will be only too glad to pursue the study which he has been giving to this matter, that in future it may receive the consideration, and I trust the action, that its importance deserves.

Mr. Alfred Thompson (Yukon): This in my judgment, is one of the most important questions to come under the consideration of this House, and I regret that I did not know that the motion was to be up for discussion this afternoon. The Minister of Agriculture (Mr. Burrell) who has charge of the department under which this arises, and who has given the subject special consideration, is not here, and for that reason, and because I know that, besides myself, there are a number of medical men, members of the House, who would like to present some observations on this interesting subject, I move the adjournment of the debate.

Plumbing Inspected in Toronto

Letters to the Editor

The Editor Sanitary Engineer:

In your issue of March 1st appears an article dealing, inter alia, with plumbing, and whose jurisdiction it should be under.

Why! that is already settled. Take any of the Provincial Health Acts you care to, and you will find plumbing comes under the jurisdiction of health authorities. Why? Because the proper installation of plumbing is essentially a matter of health, being the first step in removing from dwellings and other buildings the excremental discharges and wastes created. If sewage disposal is a matter which concerns the public health and for which health boards are responsible, surely the plumbing with all fixtures at the other end of the system, is as much, if not more so, a matter for the careful consideration and supervision of the same authorities. In all works on sanitary law and practice the water supply, heating, ventilation, plumbing, drainage of houses, drains, sewers and disposal of sewage are matters vested in the sanitary authorities. Without discussing architects' ability to assume responsibility for plumbing and sanitary engineering it must be obvious such inspection is outside their province—their work is to design, arrange and compile a whole variety of materials and ideas into one harmonious scheme for erection.

Health boards cannot divest themselves of their responsibility or hand over their jurisdiction to any other municipal department.

The various P.H. Acts provide for certain officials whom health authorities must appoint, viz.: Medical officers of health and sanitary inspectors. In cities such as Toronto surely such officers in the service of health departments are men qualified to perform the duties of their respective offices, and if so is it not a slur on their professional characters to consider for a moment the handing over of duties for which they have trained, to any other department? A properly qualified sanitary inspector is the proper official who should inspect plumbing, as plumbing and house drainage forms one of the principal matters with which he must be familiar in order to obtain from the examining body a diploma or certificate that he is qualified to perform the duties of a sanitary inspector.

The plumbing inspector has no status as an official of any health authority, indeed, the office has been created by the sanitary inspector, and the official acting as such is simply an assistant to the chief of the sanitary branch. In many places no such official is specially designated, and assistant sanitary inspectors (in their respective districts) usually take all sanitary work including plumbing inspections. This, too, is the better practice, as it gives opportunities for acquiring proficiency by inspectors in all branches of work belonging to them. In smaller cities where the sanitary inspector is the only official, he does this work, and none were at one time more antagonistic to any inspection than plumbers, although now there are no better friends than plumbers and sanitary inspectors — they understand each other, are helpful, the one to the other, and are both working harmoniously in the interest of the public health.

Apart from what has been stated above, perhaps the best argument why plumbing should be retained under health boards is because all complaints regarding house drainage are made to the health office for attention, and any inspection and remedy is usually the result of the sanitary inspector's report. Permits for the installation of plumbing and house drainage together with the plans and layout of same ought to be in the health office.

The principles of plumbing must be understood, and although problems arise daily in the course of inspections it requires no ten-year apprenticeship to make an efficient inspector of plumbing.

Much might be said of the efforts of aldermen to interfere with municipal departments by dividing work with a view to apparent saving, but there is much truth in the saying "every man to his own trade," and Toronto will do well not to divorce the health department's responsibility. Where this has been done experience has shown that instead of a saving having been effected the reverse has resulted.

SASKATCHEWAN.

Note.—We are pleased to say that the Toronto city council turned down the proposal to move this department and it it still under and part of the Toronto Board of Health.—Editor.

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MAY 1, 1916

FEDERAL HEALTH DEPARTMENT

ON another page there appears the last instalment of Dr. Steele's bill in favor of a Federal Department of Health.

Those who have read it through will no doubt wonder what the sponsor of the bill is driving at. There is really no plan given defining what such a department would accomplish and from one source or another we are given the impression that Dr. Steele's idea was really to organize a department of medicine. If this be the case, we cannot agree with him.

A department of medicine would not be a department of health, but rather the reverse.

Medicine is for the sick and if the worthy Doctor had such an idea in mind as a department for doctors, medicine, etc., why not call it a federal department of sickness.

THE SANITARY ENGINEER is heart and soul in favor of a federal department of health, a department composed of men who can prevent sickness, by keeping the people of Canada in good health; a body of bacteriologists, expert water supply engineers; men who understand sewage disposal problems; men who can prevent our waters as well as our lands from being polluted; men who are sanitary experts, be the kind of work whatever it may: heating, ventilation, pure food supply experts, pure water experts and the like; not a bunch of quack doctors.

The people of Canada want to know how to keep well, not how to get well after sickness. Prevention is better than cure and sanitary engineers stand for prevention of ills, while medical men stand for cures for ills.

This federal department of health should also comprise a body of men actively engaged in experimental work of its own. For instance: The city of Toronto has a big cesspool on Morley Avenue. No one who knows anything about sewage disposal is allowed to inspect it. The commissioner knows the dirty mess is practically unmanageable and knows who is responsible for it, too.

When the proposal was made some time ago to have it abolished, he said "go slow," don't spend money on any new scheme until some other city finds out something about the newest method of sewage disposal, that of the activated sludge method. The city of Toronto is willing to let someone else do the experimenting and the same feeling prevails throughout the Dominion.

Why not have a number of experimental stations all over the Dominion, supported by the Dominion Government? Then every city, town or village would have a perfect right to benefit by such research work. As it is now, one town or city pays the piper, the other reaps the benefit, no matter in what province these towns are located.

One city wishes to have water from some source in another province, the latter blocks the way. One township wishes to instal a sewage disposal plant in another township on account of the geological situation, and there is trouble.

If Toronto is sick, Canada is not well, neither is Ottawa. When Ottawa was suffering from the recent typhoid epidemic, Toronto was sick, as also was the Dominion. We badly need, as we stated before, a real, live federal department of health, a department for safety first, not for a cure afterwards.

PUBLIC COMFORTS

WHEN Ontario goes dry, her towns and cities will require to furnish a sufficient quantity of rest-rooms and public comfort stations. Only hotels and railway stations have so far provided such places heretofore.

When we refer to public comfort stations, we mean respectable places, buildings built on the top of the ground, in the same way as any other building. In Canada the most modern public comfort stations are buried in a hole, using at best poor, arti-

ficial light, the latest to be built being the one on O'Connor St., Ottawa. To-day there is urgent need for real comfort stations, not mere holes to burrow in while having a wash or brush up, or using other sanitary conveniences. The country wants comfort stations, including rest-rooms, with respectably dressed attendants, places where a hot or cold bath can be had, as well as all other conveniences which are already furnished in the underground places, some of which at present existent in the city of Toronto are a disgrace.

Very soon the National Exhibition will again be in full swing and the public lavatories there will be "as usual." During certain hours of the day these places are vile with filth. Why? Simply because our city fathers seem to have the idea that such places should not be allowed to see the light of day; that no respectable person cares to be seen entering them.

This is a wrong viewpoint; and even if it were not, why not furnish more than mere lavatory conveniences? Why not rest-rooms? Why not different kinds of baths?

The city of Toronto, like all other towns, has a certain number of traveling people, people who, with the passing away of most of our hotels, will be very poorly catered to in this respect. Why? we ask again. The city, town or village which does not furnish ample public comfort stations is not doing its duty; and very few are, in Canada, we are sorry to admit. Even those public lavatories which are at present provided could be greatly improved.

In future issues of The Sanitary Engineer we will show what is being done in other countries in this matter and how public authorities are regarding it as one of their first duties to provide for the comfort and convenience of their fellow-citizens in this respect.

SANITARY ENGINEERS

THE old saying, "Charity Begins at Home," is no doubt as familiar as almost any other. It is applicable to every person living under the sun, and means more than the mere words. Especially is it applicable to the sanitary engineer. If a member of the craft assumes the title of "sanitary engineer," he should be a sanitary engineer at home, as well as in the other fellow's home. And, further, he should not by any means allow mere dollars and cents to besmirch that title. For instance, he should refuse to instal any system under the guise of a "sanitary system" that is not in every sense of the word a sanitary system. Simply because there are no by-laws in force in his district should not warrant him installing plumbing fixtures or appliances in a way that is not in accordance with the very best practice.

The season is opening up and there will be thousands of farm homes and rural residences equipped with sanitary fixtures. These should by all means be installed according to the very best known practice. Else the trade is lowering itself to the level of the botcher and the handy-man, who are responsible for the big mail order houses selling so much plumbing material.

SANITARY HEATING ENGINEERS

TO-DAY, as never before in the history of the trade, people are attaching more and more importance to the heating of their homes and buildings. Here is a case which came to the notice of the writer:

A gentleman intended to make certain additions to his home, and asked the writer to look over the situation. His occupation was such as required him to be absent from home at times as long as 18 hours, in consequence of which the furnace fire often went out; or, on the other hand, the lady of the house would open up the drafts, put fire on and frequently have the house too hot.

It transpired that a heating engineer had been called in and had decided that a certain larger-sized furnace would meet the difficulty.

The writer, upon inspection, advised that the system be equipped with a temperature controlling device, and a more modern as well as a still larger furnace than the heating engineer advised. Further, the question of ventilation in conjunction with the heating system was also advised and accelerated heating was recommended.

These recommendations were adopted, with the result that instead of the job, which every Tom, Dick and Harry was tendering upon, being bungled, it is being installed by a reputable firm, a firm of sanitary heating engineers.

Now, here's the point: If a home is to be heated, it should be heated properly. The equipment should be complete and ventilation which cannot and never will be isolated from heating should play an important part.

It is all very well for some of the trade to remark that unless one cuts the price, or instals the job to fit the price, that he will not long be in business.

Do medical men ever consider the price when prescribing medicine for their patients? Do patients ever consider the price when consulting a medical man, or when requiring the very best advice do we consider price? No, what we want is results, and it is the same with heating and ventilation. We would strongly urge that those men engaged in the heating business, strive to become "sanitary heating engineers," by becoming identified with good work, complete installations and taking the stand that a home or building should be equipped with all that makes a complete sanitary heating system. Temperature control, humidifiers, ventilation, ample heating surface and boiler capacity—only buildings thus equipped can claim to be in a sanitary condition.

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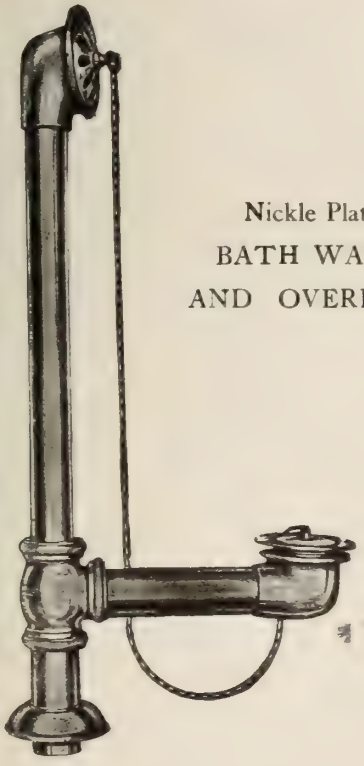

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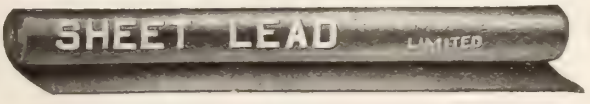

CATALOGUE "A" MAILED FREE ON REQUEST

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BRANCH FACTORIES: MONTREAL AND WINNIPEG

Sewage Disposal for Country Homes

Its Principles Will be Described, Showing That This Problem is Largely Governed by the Laws of Nature—Success Cannot be Attained if Natural Laws Are Disregarded

As the winter breaks up and building takes life again all over the country, and particularly in rural districts, the question of sewage disposal receives more attention.

Farmers or residents in rural districts begin to clean up, reconstruct, and in thousands of homes in the country bathrooms will be installed as well as all manner of plumbing fixtures and other sanitary appliances.

And when all has apparently been considered, the most important question is oftener than not left till the last, when in reality it should be the first consideration. I mean that of sewage disposal. There are scores of would-be authorities who, in spite of their better self, are content to lightly look over the question of sewage disposal.

Budding journalists of the daily press write all kinds of flowery stories about the city conveniences on the farm, etc., which, to put it mildly, are misleading.

The cesspool, that hidden abomination, is given new life, and is endorsed by many of these "penny-a-liners," when in actual fact they know very little about sewage disposal. If they did the cesspool would never be mentioned.

It is all very well to hear that this farmer or that resident in some country-place has been using a cesspool for years, and has never experienced any trouble; and we will not deny that such cases are common. But the very fact that science has proved beyond a doubt that a cesspool is not a fit thing to have either near or far away from a home should be sufficient to prevent a cesspool ever again [illegible].

The writer visited a certain town some months ago and found that cesspools were being installed almost on every [illegible] deep. That all the ground in that town [illegible] of was being connected to the overflow [illegible]

[illegible] low the surface, too, would not help matters very much. And, despite warning, the medical men of that district appar[illegible]

[illegible] town or the residents in a rural district are taking, but to show the need for practical sanitary engineers in all such [illegible]

distant date, sanitary engineers will be called upon to assume. Such being the case, the question of sewage disposal for country homes cannot fail to be of great interest to the craft.

It might be well to give a brief history of the subject. Away back in the year 1857 a Royal Commission was appointed in England, whose duty it was to inquire and report as to the best and most effective way of dealing with the problem of sewage disposal for small towns, and scores of systems were reported upon, some of which no doubt proved to be very crude.

Sewage Defined

Many authorities have given as their definition of sewage as many terms peculiar to their own experience, but all agree with what Dr. H. Marshall Ward, of Cambridge University, termed the definition of sewage in a broad sense:

"Sewage may be defined as a mixture containing a large quantity of water holding in solution certain organic bodies obtained from both animals and plants, containing certain quantities of salts and of animal excreta like urea, and especially vegetable remains like cellulose and certain solid debris of animals and plants; and mixed with these products of their decomposition in various stages of simplification as they are breaking down into simpler things."

Dr. Ward's definition is very simple and understandable by all.

In several countries years ago the sewage from the home in rural districts was allowed to empty into a water-tight well or shaft, several feet deep—yes, as deep as 20 feet, and the water or farmyard drainage also found its way into this well. This fluid was then pumped up into a large butt mounted on wheels, and finally distributed on to the land. This system is no doubt still in vogue in some districts.

The question, however, of disposing of domestic sewage became a more interesting problem, both in cities, towns and rural homes, and, while the land treatment method has many points to commend itself, it is not by any means practical in this country except at certain periods of the year.

Another method of disposal is that of chemical precipitation which, while in many cases resorted to, has not proved to meet the needed requirements, because in most cases after precipitation there was found a necessity to screen or separate such solids as paper and the like.

Then, again, it is questionable whether sewage thus chemically treated is really fit to be either distributed upon the surface of the earth, or absorbed in underground tile pipe.

Many so-called chemical closets have proved to be anything but sanitary, and unless those marketing them will guarantee that the chemicals furnished are not injurious to plant life, they should not be bought.

The writer had an experience with one such closet. The chemical furnished, no doubt, as claimed, rendered the closet odorless, but wherever the fluid was emptied the grass ceased to grow.

The first real and practical step in sewage disposal is said to have been found by W. D. Scott Moncrieff, who in 1891 invented what became known as the Moncrieff cultivation tank. It consisted briefly of a chamber filled with large stones, supported by an iron grating, into a space under which the sewage is admitted, and through which the sewage passes slowly upwards, escaping by an overflow at the top. The stones were furnished for the purpose of affording a resting-place for the anaerobic bacteria which acted in a manner to liquefy or break up the solids.

It will be seen that the Moncrieff tank might really have been the beginning of what is now known as the septic tank, though not so claimed. The apparatus to first come under the title of "the septic tank" was really invented by Donald Cameron, surveyor of the City of Exeter, in 1894, just three years after the Moncrieff tank was invented.

As many of our readers are already aware, the septic tank, while modified in many ways, as well as improved, is still constructed upon the same principles as the septic tank of years ago.

There are still the same laws of nature involved to-day as in times past, and those who depart from these laws cannot attain any degree of success with septic tank construction.

In our next issue we will describe various tanks which are claimed by some to be O.K., but which, as we will show, are not so, owing to the fact that the simple laws of nature governing the successful working of such tanks have been disregarded.

(Continued in next issue.)

Rural Sanitation

A Continuation of the Sanitary Science Course That Has Been Appearing in the Sanitary Engineer, But Having Particular Reference to the Sanitary Disposal of Household Wastes in Unsewered Districts

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE NO. 22

SEWAGE is defined by the American Public Health Association as "water-conveyed excreta". The word is however generally understood to mean refuse in a more or less liquid form that is drained away. When referring to the disposal of domestic refuse, solid or liquid, which under favorable conditions would be carried by water in a drain or sewer, the term "sewage disposal" will for convenience frequently be used in these articles even when such refuse is not drained away by water carriage and should not therefore in strictness be termed sewage.

The purifying power or action of the soil has been spoken of as a fundamental principle underlying the sanitary disposal of sewage. To understand the action of the soil upon sewage it is necessary to know something about the soil and the soil bacteria.

Fig. 4 shows in a general way what are the average soil conditions at the surface of the earth. If we can imagine the time when this earth consisted of ocean and land, the latter composed of granite or granite-like rocks with an atmosphere in which there was, as at present, a certain quantity of carbon dioxide gas, then under such conditions water and air would (though very slowly and acting through many years or even centuries) weather the rocks by physical and chemical action. The carbon dioxide in the air and in solution in the waters of lakes, rivers and ocean had a chemical action in dissolving and breaking down the rocks. Water freezing in cracks or fissures in the rocks split them. Rivers carried along pieces of rock torn away from the banks and this helped to break up other rocks along the river bottom and banks. Large sheets of ice ground the rocks along the shore and glaciers in their slow motion broke away and carried along rocks and ground the rock surface over which they passed.

Through these various actions, which are still taking place on the earth, some of the rock material was ground up fine enough to make gravel as we now find it. The more finely ground up material is known as sand and in general is the quartz part of the original rocks forming hard, clean, sharp particles.

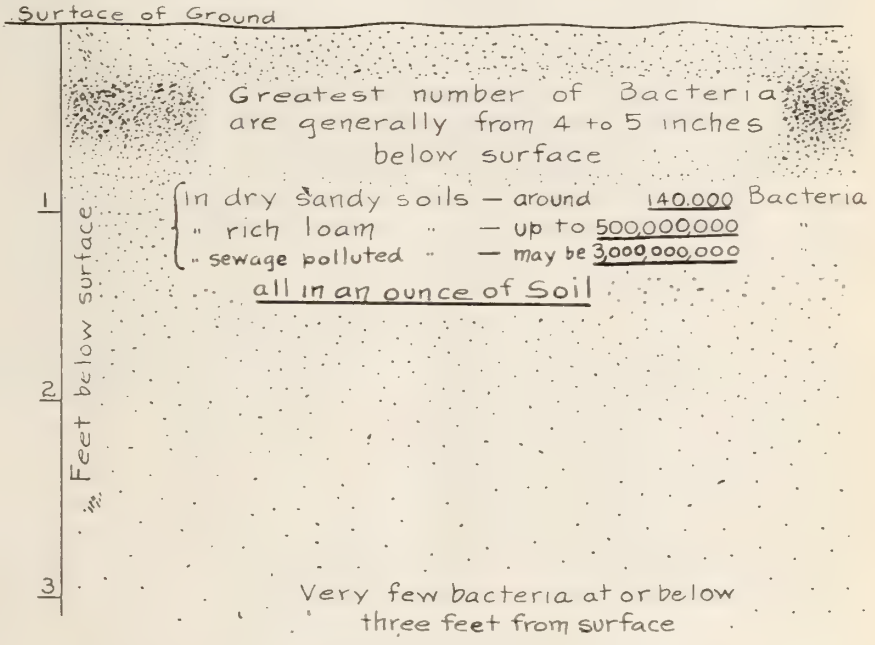
Other parts of the rock were capable of being more finely divided into dust-like particles which we term clay. Clay is compact and brittle when dry but plastic and tenacious when wet. It is therefore very different from sand which is more open and porous, allowing water to drain readily away and having larger voids for the admission of air.

We are not here concerned with how plant and animal life came onto this earth. But the plants now grow in the soil formed largely of sand or clay but preferably a mixture of these termed a loam. The sand and clay as explained came from the rocks and have been deposited in various ways on the earth's surface.

When plants die they decay in the soil, under ordinary conditions, forming through bacterial action, humus, which is suited for future plants to grow in. Sand and clay contain the chemical compounds necessary for plant growth. It takes time, however, to get these compounds into solution with the soil water, which is the only way they can be used by the plants and humus, therefore, is a readier form of nourishment. It should be noted that the supply of carbon needed by plants is got entirely from the carbon dioxide of the air and not from the soil.

If plants are eaten by animals, then the animals' excreta and eventually their dead bodies are returned to the soil to be broken down by certain decay bacteria and then built up by other bacteria into suitable plant food.

This return of dead animal and plant matter adds humus to the surface soil and distinguishes it from the sub-soil, which consists largely of only sand and clay, and which on account of its location cannot be so well aerated. In clay soils the humus divides the particles and makes the soil more open, as is desirable.


Surface of Ground
Greatest number of Bacteria are generally from 4 to 5 inches below surface
In dry Sandy soils — around 140.000 Bacteria
" rich loam " — up to 500,000,000 "
" sewage polluted " — may be 3,000,000,000 "
all in an ounce of Soil
Feet below surface
1
2
3
Very few bacteria at or below three feet from surface

In considering the disposal of household wastes in or on the soil, a definite classification of soils is useful and important. The following definitions have been furnished by the Chemical Division of the Dominion Experimental Farms:

Drift soils are of glacial origin and consequently of variable composition. they consist usually, however, of loose material—chiefly fine and coarse sand gravel with more or less rounded small stones and boulders. As a class these soils are "light" and frequently poor, not necessarily from lack of the mineral constituents of plant food but from unsuitable physical condition and defi-

ceney in vegetable matter and its concomitant nitrogen.

Alluvial soils are those which have been transported and deposited by water, fresh or salt. There are many classes or varieties, both as to texture and composition, according to the character of the country furnishing the detritus and the velocity of the current; usually the particles are fine or moderately fine. Many of the most fertile soils are of alluvial origin, e.g. deltaic and valley soils, their productiveness being due largely to the intimate association of an ample supply of organic matter with the rock debris forming the mineral basis of the soil.

Gravelly soils are those consisting essentially of gravel or small water-worn fragments of rock with more or less coarse sand. The amount of fine material will not usually exceed twenty-five per cent., and the humus content is never large. As a class, they are among the poorest of arable soils.

Sandy soils contain 80 per cent., or more of sand principally finely comminuted quartz, with not infrequently fine material from the disintegration of crystalline rocks in general. The amount of clay present is less than 10 per cent. They may contain notable percentages of oxide of iron, carbonate of lime, etc.

Clay soils contain at least 60 per cent. of clay, the remainder being chiefly made up of sand and vegetable matter.

Loams are essentially mixtures of clay and sand and are classified according to the degree of preponderance of one or other of the constituents, as follows:

Heavy Clay Loam: containing from 75 to 90 per cent. of clay.

Clay Loam: containing from 60 to 75 per cent. of clay.

Loam: containing approximately equal amounts of clay and sand.

Sandy Loam: containing from 60 to 75 per cent. of sand.

Light Sandy Loam: containing from 75 to 90 per cent. of sand.

N. B. Organic matter (humus forming material) and carbonate of lime, are present to a greater or less extent in all productive loams.

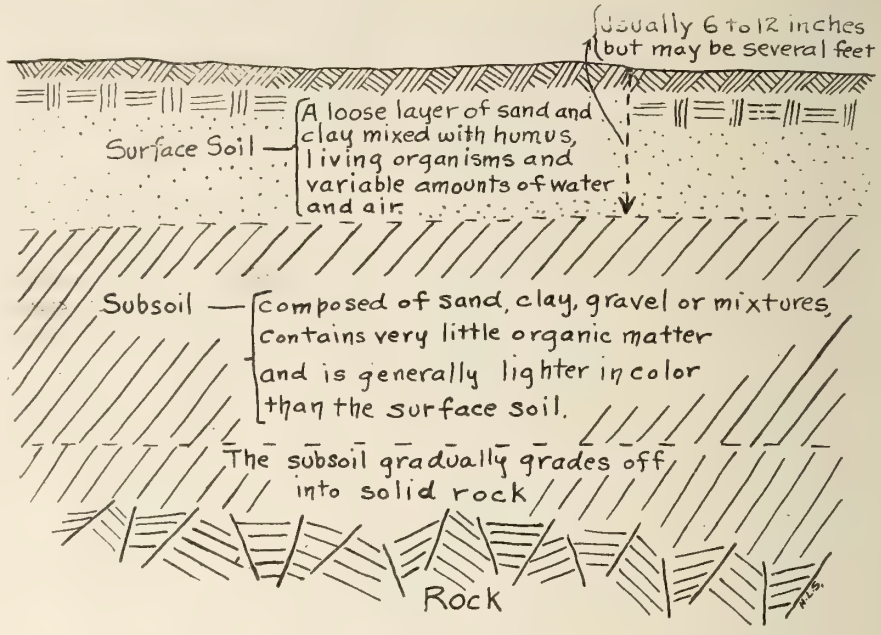
Marl is a calcareous clay, containing from 10 to 20 per cent. of carbonate of lime. (Shell marl is essentially carbonate of lime.) It occurs as an earthy deposit at the bottom of lakes and ponds and is composed largely of the distintegrated shells of fresh water molluscs. When dried it has a chalky appearance.

Lime or Calcareous soils contain carbonate of lime as a characteristic or distinguishing feature.

Alkali soils occur in arid and semi-arid districts and are characterized by the presence of considerable amounts of certain soluble salts, chiefly the sulphate, chloride and carbonate of sodium. These salts may appear on the surface of the soil as an efflorescence, usually white, in seasons of scanty precipitation. "Black" alkali, due to carbonate of sodium, is the most injurious form and may be recognized by the incrustation being dark brown or black, from the presence of organic matter dissolved from the soil by the alkali.

Hardpan, the name applied to the subsoil when such has become converted by chemical and physical agencies, into a hard, tenacious rock-like stratum.

Many animals play a part in the making of soil. Rabbits, gophers and moles draw up the raw subsoil to be weathered and acted on. Earth-worms digest anually, it is estimated, ten tons of soil per acre, thus enriching it. The roots of living plants also take a part in soil



Peaty and muck soils have resulted from the gradual accumulation in the presence of water of plant remains and hence consist largely of organic matter.

In peat the structure is essentially fibrous, clearly indicating the origin from sphagnum and other aquatic plants. In muck (swamp muck), further decay has destroyed or broken down the fibrous structure, resulting in a black or dark brown material, which is usually of a more or less cheesy consistency when wet.

Humus soils are those rich in semi-decomposed vegetable matter but which have been formed under water, as in the case of peats and mucks.

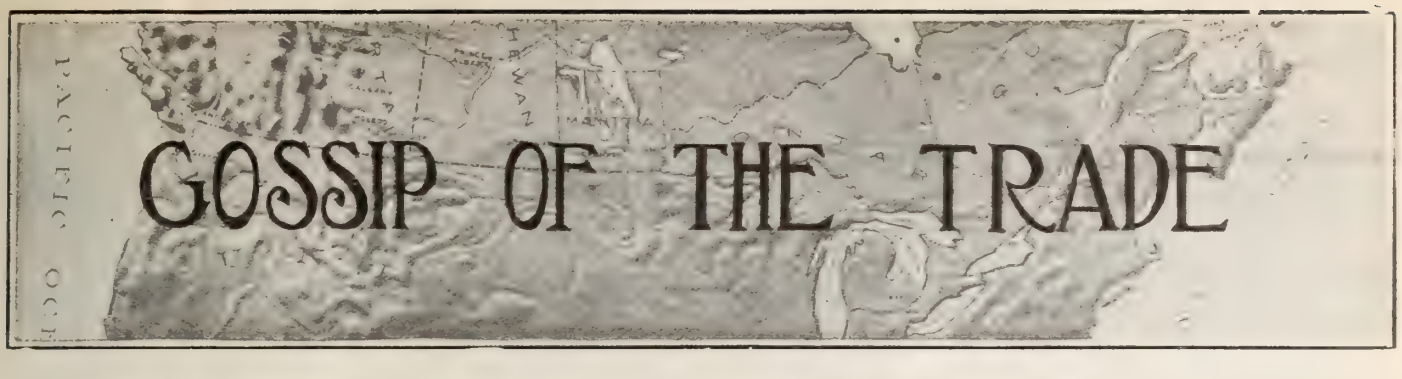
Surface soil, generally spoken of as the soil or as the arable soil, is the upper or surface stratum used in cultivation and which in addition to disintregrated rock material contains as a rule more or less humus—the decaying remains of plants.

Subsoil is the unweathered, naturally undisturbed stratum immediately underlying the surface soil and may consist of sand, clay, gravel, etc., or mixtures of these. It is practically destitute of organic water.

changes, actually splitting rocks and giving off carbon dioxide to assist in chemical changes. But most important are the bacteria which throng the upper few inches of the earth's surface. Here, near the surface, is plenty of food for the bacteria, and plenty of air between the soil particles, and also sufficient moisture for their purposes. Four or five inches below the surface seems to be the most favorable location for the bacteria. Fig. 5 shows diagramatically their distribution in the first three feet of the soil below which point there are probably very few bacteria.

For the disposal of sewage by sub-surface, open-surface, open-jointed tile it can be seen that by placing the tile much over a foot below the surface there are comparatively very few bacteria ordinarily present to act on the sewage and purify it. Also it is difficult to get sufficient air in most soils at depths of over a foot or two from the surface.

(Continued in next issue)



TORONTO VISITORS

Foster Kelly, plumber and hardware merchant, Fenelon Falls, paid a visit to Toronto last week. Mr. Kelly was busy making purchases for the season's work in his plumbing and heating department when seen here.

Mr. Ivey, of the International Malleable Iron Co., Ltd., Guelph, was also a business visitor in Toronto last week.

And to see the smiles and jolly good looks upon the countenances of J. McLaren, manager of Galt Brass Co., and Chester Stevens, of the Empire Mfg. Co., Ltd., London, certainly made one more feel good. They both had the appearance of two men who had either just dodged a fearful calamity or else booked a good big order each. Let's hope the latter anyway.

SERIOUS FIRE LOSS

Damage to the extent of $15,000 was recently caused through a fire which had it origin in the plumbing shop of Mr. Bissonette, situated on Cote du Passage, Levis, and which ate its way to the warehouses of the wholesale and retail firm of Messrs. George and Edmond Couture, general merchants.

The blaze, which was a spectacular one, was watched from Dufferin Terrace and the Lower Town in this city by hundreds of people, many also crossed over to the scene of the conflagration to view it to better advantage. There was a strong easterly gale blowing at the time, and it was not long before the Couture property became a prey to the flames.

The Bissonette plumbing shop and the two warehouses adjoining were totally destroyed, as was also a portion of the roof of the main store of the Messrs. Couture. The firemen, however, succeeded in confining the flames to the roof, but the stock in the store was considerably damaged by smoke and water.

It is estimated that the damage to the stock is about $13,000 and that to the buildings about $12,000, which is partly covered by insurance.

The Couture firm, which is one of the largest in Levis, was founded in 1841, by the late Hon. George Couture.

"I CAN'T!"

"I Can't" lacks in nerve: he's too faint of heart
To pitch in like a man and do his part;
He's none of the spirit that fights and wins;
He admits he's beaten before he begins.

"I Can't" sees as mountains what bolder eyes
Recognize as mole hills; ambition dies
And leaves him complaining in helpless wrath,
When the first small obstacle blocks his path.

"I Can't" has a notion that, out of spite,
He's being cheated of what's his right.
The men who succeed by hard work and pluck,
He envies, and sneers at as "Fools for luck!"

"I Can't" is a loafer, who won't admit
That his life's the mess he has made of it:
The treasure that's sparkling beneath his eye,
He thinks he can't reach and won't even try.

"I Can't" has a feeling the world's in debt
To him for a living he's failed to get:
But, given a chance to collect, he'll rant
About past failures, and whine, "I can't!"

CHARLES R. BARRETT.

JUST PASSED ON

L. H. Estano, Moncton, One of the Most Esteemed Members of the Craft, Has Passed Into the Great Beyond

We very much regret to have to report that since last issue of The Sanitary Engineer was published, another of our members in the person of L. H. Estano has answered the last call.

Mr. Estano, who was forty-nine years of age, was well known and highly esteemed. He has conducted a plumbing business in Moncton for many years, having his place of business in the Victoria block on Main Street. He was also a member of the Canadian Society of Sanitary and Heating Engineers, and for several years took an active part in the society.

Mr. Estano was appointed by the members to the responsible position of secretary during 1914 and 1915, and was highly complimented for the way he carried on these duties by the Dominion delegates when in convention at St. John, N.B., last June, in spite of the fact that he had at that time been ill for some time previous.

The delegates at the 1915 convention, too, further honored Bro. Estano by appointing him chairman of the committee on essays, which office he held at the time of his death.

The Sanitary Engineer is only voicing the feeling of every member of the society in saying that Mr. Estano will be seriously missed, and we take this opportunity of conveying our heartfelt sympathy for those he has left behind.

NEWLY-ELECTED OFFICERS

When Thos. Ferguson joined the fighting forces it left a vacancy in the Toronto Society, he being its vice-president.

Bro. F. R. Maxwell, one of the old stand-bys, and a past president, again agreed to help out, and was therefore appointed the new vice-president for the unexpired portion of the business year.

New Chairman of Entertainment Committee

Harry Farthing also took upon himself, at the request of a majority of the members of the executive committee, the position of chairman of entertainment committee. Harry is at last holding the position which will give him the grip of everybody and everything in the entertainment line. We would, however, warn those members who have **not** had the grip to keep their hands off Harry, particularly when he wishes to extend the right hand of fellowship. He's the man with the grip all right.

TORONTO VISITOR

H. White, sanitary and heating engineer, Brantford, was a business visitor to Toronto last week.

ANOTHER TORONTO MEMBER HEARD THE CALL

H. Griffith, of the firm of H. Griffith & Co., heating engineers, 1128 College Street, has also joined the fighting forces. He was a very active member of the Toronto Society of Domestic Sanitary and Heating Engineers, and up to the time of donning the khaki, held the position as chairman of the entertainment committee.

Still another member of the Toronto Society dons the khaki in the person of Albert Edward Crowne, of the firm of Crowne & Shore, sanitary and heating engineers. He is now attached to the Sanitary Corps, Army Service Division.

"Bert" was well liked by those with whom he associated, and was a respected worker and member. His partner, Wm. Short, is also doing his bit by engaging in the manufacture of munitions during the slack time.

BRANTFORD SANITARY ENGINEER JOINS

A. Taylor, sanitary and heating engineer, Brantford, has also heard his country's call, and is now a member of the 215th Battalion. Mr. Taylor is a live sanitary engineer, and has taken a keen interest in sanitary construction. He has two brothers, who have already gone to "do their bit."

The Sanitary Engineer joins with those of our friends and members of the craft in wishing all those who have "heard the call" God-speed and a safe return with honors and for victory over the dreadful foe whom they have gone to fight.

DELEGATE APPOINTED TO 21ST ANNUAL CONVENION

The Montreal craft are already making plans to do their part at the 21st Annual Convention of the Canadian Society.

A. Charette, the worthy provincial vice-president for the Province of Quebec, was appointed the delegate for that province.

WANTS CATALOGUES

The Toronto Society of Sanitary and Heating Engineers have decided to make their permanent quarters still more popular, and of greater use to its members, by installing a reference library. Books, papers, magazines of interest to the trade can be seen and referred to at leisure, and one of the departments will be a catalogue and price list file or cabinet.

Manufacturers and Jobbers Please Note

In view of the above, the society desire to be furnished with catalogues, price lists and discount sheets, and to receive notice of all or any changes in prices which may from time to time take place. Address: Toronto Society of Domestic Sanitary and Heating Engineers, 22 College Street, Toronto.

A. CHARETTE

Vice-president for Quebec. Appointed delegate to the 21st Convention, to be held in London.

JOINED THE RANKS

Fred Sainsbury, sanitary and heating engineer, Weston, Ontario, has heard his country's call, and has joined the fighting forces.

Mr. Sainsbury was an active worker in the Ontario Society of Domestic Sanitary and Heating Engineers, and will be greatly missed.

He leaves a wife and seven children, which no doubt proves that Bro. Sainsbury has taken his country's call to heart seriously.

He has two brothers already at the front. The battalion to which he is attached is the 4th divisional column, Ammunition Park, Mechanical Transport.

"I WILL!"

"I Will" has a spirit that nothing daunts:
Once he gets his eye on the thing he wants
He rolls up his sleeves, and he pitches in
With a splendid zeal that is bound to win.

"I Will" never hesitates lest he fail—
In his heart he's sure that he will prevail.
No mountain can halt him, however high;
There's no task so hard but he'll have a try.

"I Will" sets his teeth when things start off wrong;
He just grins, and mutters: "This can't last long.
I'll take a fresh start; and Adversity
Will be going some if he catches me."

"I Will" has a punch hid in either hand;
He has training, strength, and a heap of sand;
He swings his hard fists in the world's grim face,
And he bangs away till the world gives place.

"I Will" understands in his own strength lies
The one chance he'll get at the things men prize.
Discouragement, failure—nothing can chill
The stout heart of him who declares "I Will!"

CHARLES R. BARRETT.

AN INVITATION FROM BUFFALO

The Buffalo Master Plumbers' Association have extended to the Toronto Society of Sanitary and Heating Engineers a hearty invitation to Buffalo to join them in their annual outing to Edgewater. The event takes place June 28th. It is to be hoped that a right royal turnout of members will greet their brother craftsmen over the line. It will be remembered that the Buffalo boys paid us a visit last year, and without doubt the event was the banner of all the outings which the Toronto Society availed themselves of last year. Secretary Frankland has been given full instructions to make all necessary arrangements. Full particulars will be published in an early issue of The Sanitary Engineer.

KEEPING FAITH WITH THE PUBLIC

One of the features which have made some business men successful is the fact that they have kept faith with the public. They have been careful not to advertise fictitious values or comparisons with cuts in prices that any sensible person would realize to be impossible. It is always well to tell the truth. Insistence should be made that every line of advertising copy represents the exact facts.

Some successful business houses will go to extra expenses to keep faith with a customer in the matter of delivery book contain much valuable data for the ed things that were well nigh impossible. One large firm in Montreal has even hired taxicabs to make certain that a delivery would be made on the time promised. Department stores will often lose large sums of money in case an error is made in their advertisement in quoting a lower price in order that they may not break faith with the public. It may seem like casting one's bread on the waters. But it is no less certain that it will return after many days.

The Rolling of Sheet Lead

The Rolling of Sheet Lead an Important Industry on which Great Strides Have Been Made. Any Width or Weight Can Now be Procured

It does not seem very long ago when to buy a piece of sheet lead at any reasonable price one had to take a piece "off the sheet."

Not only so, but in most cases considerable waste was impossible to avoid. It was frequently next to impossible to get the weight per square foot that was needed without buying much more than was required, and it was often necessary to wait until it was imported, which resulted in work being tied up for an indefinite period.

When the sanitary engineer places an order for sheet lead calling for special size and weight, does he ever stop to consider what care has to be taken to produce what he requires?

In the illustration accompanying this article is seen the method of rolling sheet lead as carried on at the plant of the Canada Metal Company, Limited, Toronto, to whom we are indebted for the view of this wonderful machine. It is certainly interesting to see the various processes of manufacture from pig lead to sheet lead.

The pig lead, which must be of the highest grade, is first taken to a melting pot, which has a capacity of over six tons. After being melted and poured into thick slabs, which weigh 6,000 pounds each, they are allowed to cool before being hoisted to an overhead trolley and taken to the rolls, which are arranged and graded to roll the lead into sheets of any desired width, length and thickness.

When the slab has been passed through the rolls a great number of times to get the desired thickness, it is then cut into lengths of 20 feet each and rolled.

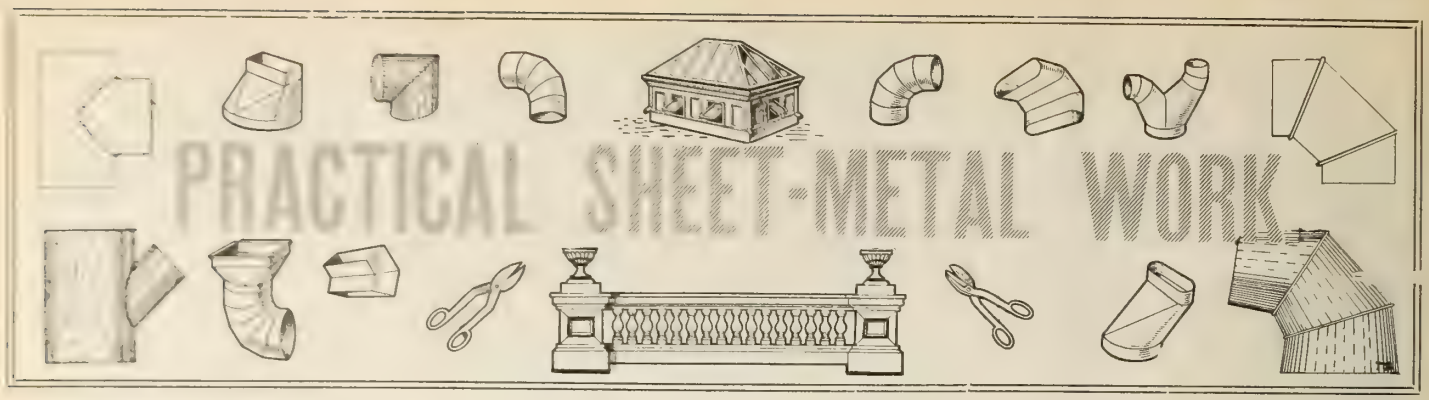
An automatic trimming device fitted with small motor and saws is used for cutting away all rough edges.

It will thus readily be seen that sheet lead can be rolled any width up to 7 feet, and to any desired length, and in any weight from 2 pounds to the square foot to 16 pounds to the square foot, and it is a great advantage to the plumber to have any special sizes rolled to any given weight, thus avoiding waste in cutting, and it should be a source of great satisfaction to know that it is possible to procure sheet lead any length, any width and any weight, which is being manufactured right at his very door as it were.

Canadian manufacturers, particularly those of such lines as are used in the plumbing, sanitary and heating engineering trades, deserve great credit for the way they have catered to the trade, and we very much doubt whether there is any industry which can claim such progress in this direction as can the sanitary and heating business. Considering the small amount, or rather proportion, of building cost apportioned to our trade, we firmly believe there is more money invested than any other line.

Such being the case, the least that can be done by those engaged as contracting plumbers, sanitary and heating engineers is to see to it that our Canadian industries are kept as busy as possible.

Rolling sheet lead. One of the largest m achines in operation under the British flag.



By CHARLES SEIVERS

IN this issue is shown a very simple method of cutting mitres or patterns for a finial or post, one square in plan, the other octagon in plan.

In Fig. 1 is shown an elevation and plan of the post, square in plan.

As already described in a previous number a square mitre can be cut from the profile or section of moulding, in this case after dividing the curved mouldings into equal number of parts, draw a line through centre of elevation as shown by A-B.

Draw two parallel lines as C-C and D-D, and at right angles draw C-D, from this point lay off the spaces between points on profile as 1-2-3-4, etc., between stretchout lines, and parallel to them, draw a line as E-E, this line to correspond to A-B, and to be used to set off measurements from.

Measure from line A-B on elevation to outer edge where each division ends, and set off from line E-E on pattern, putting measurements on line 1 of elevation on line 1 of pattern, line 2, on line 2 and proceeding carefully with remaining lines in similar manner.

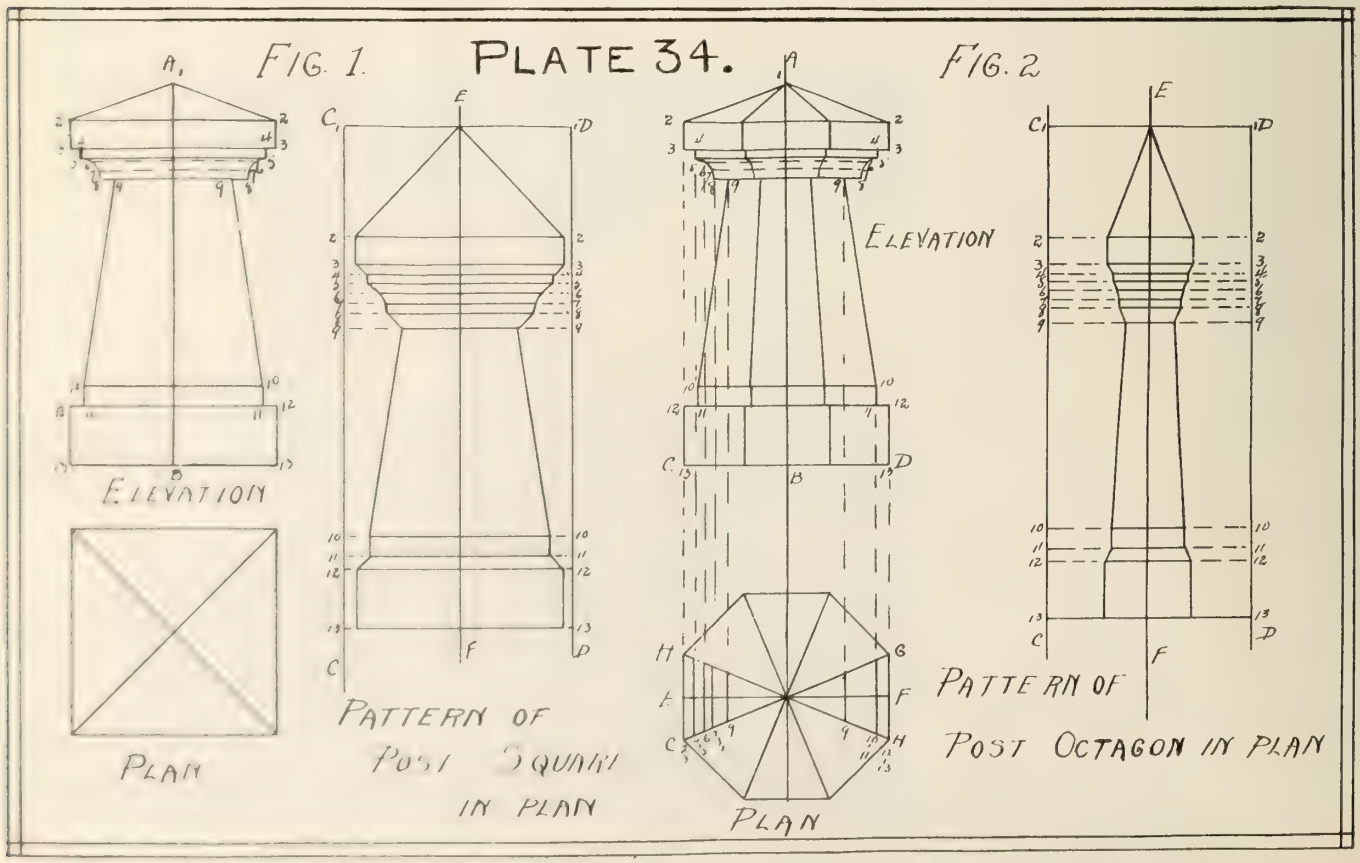
When all are set off a line drawn through points obtained will give outline of pattern desired. In Fig. 2 is shown the elevation of a post octagon in plan on a line parallel to its base as C-D.

Draw a plan view of post as shown by octagon drawn on line E-F. Divide the profile of elevation as described in Fig. 1, and from each point draw a line parallel to centre line A-B, until it intersects the mitre lines on the plan.

In order to keep the lines from being bunched up too close, the upper part of post from points 1 to 9 are drawn on one-half of plan and from 9 to 13 on opposite half of plan as shown by G-G and H-H.

Draw two parallel lines and connect at right angles as C-C and D-D and C-D, from C-D on each line lay off the divisions on profile. Parallel to C-C draw a line as E-F. Measuring from line E-F on plan to the mitre lines G and H, set off the distance on line 1 on line 1 on stretchout. On line 2 of plan on line 2 of stretchout and repeating in similar manner on remaining lines. When two points as 2 and 3, 4 and 5, etc., come on same line, the same measurement does for both.

When all are set off a line drawn through the points obtained will give outline of pattern desired. Should the post be any regular polygon in plan the method of developing the pattern would remain the same.



Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

IS THIS PROPERLY INSTALLED?

Editor, The Sanitary Engineer: Would you kindly inform me in your next issue whether I can improve the installation a sketch of which I herewith enclose. There is not much hot water given and I've been told that the trouble is because I have made a trap by running the top pipe from the water front over the door and down, I would like to know whether this is so. I could connect this pipe at the top as shown by the dotted lines. I was also told that the pneumatic water system is not properly installed, this however, works alright, but I would like to know where my mistake is, as this is the first one I have put in. I have never seen any sketch in The Sanitary Engineer only the tables of this system, hoping for an early answer.

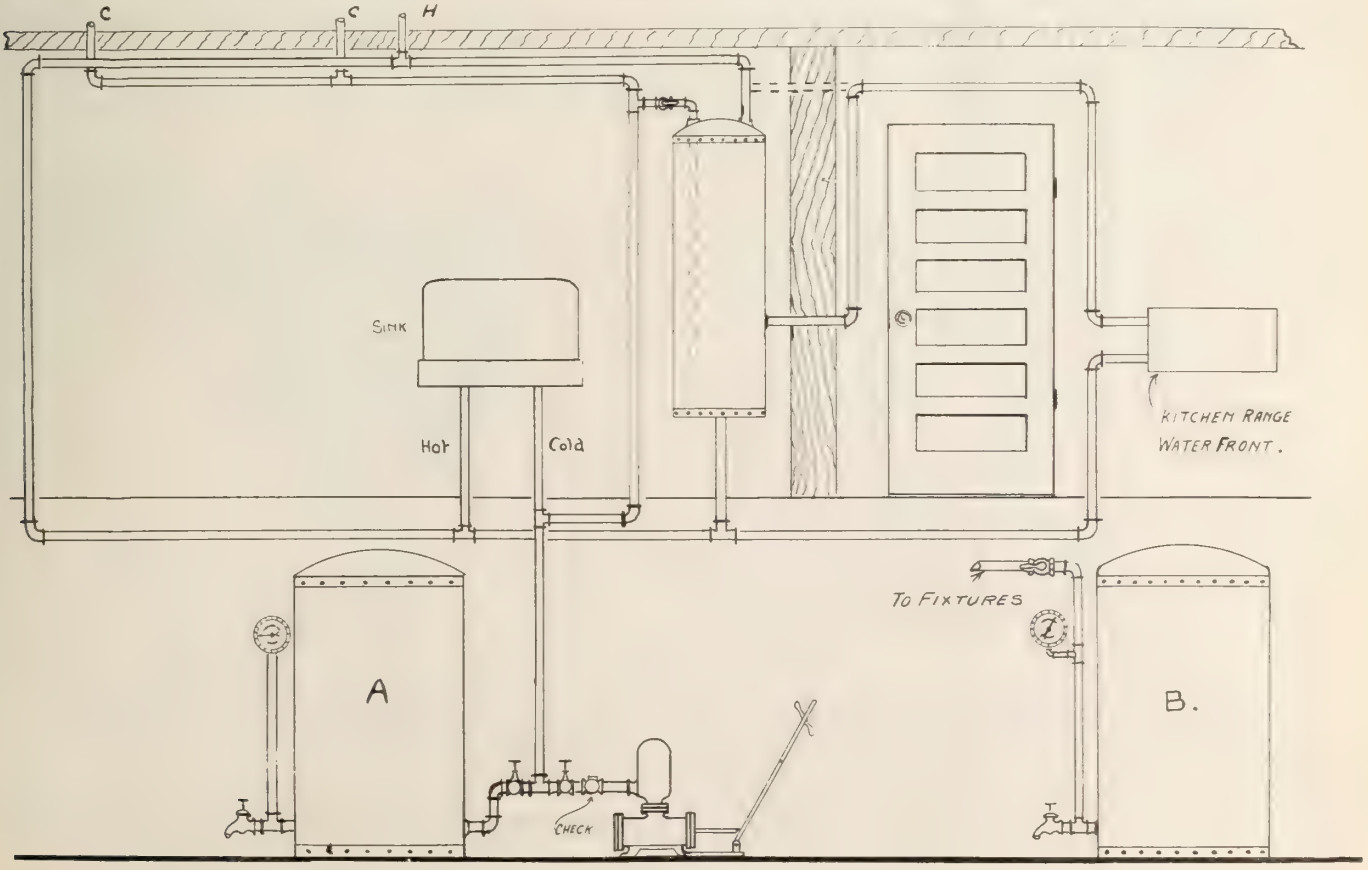
J. G. R. a New Reader

The accompanying sketch Fig. 1 has been submitted and referred to by J. G. R.

Regarding the way the hot water supply is connected between the range boiler and the water front, the reason why very little water is being furnished is as follows:

The tap pipe is looped and will form an air chamber in spite of all that can be done, even though an air vent were installed the water would do so though being heated a little by off air. There is also a trap formed by dropping the pipe to the side inlet of the boiler. This is the reason why a poor supply of hot water is being received. The remedy can be properly effected by connecting the pipe as shown by the dotted lines through the partition from the top of the loop to the hot water supply pipe at top of boiler.

Regarding the way the pneumatic system is connected, it will be seen that the piping of the system is on the pump side of the tank, this is not advisable for various reasons, of course, while the system no doubt works alright, there may not appear to be anything particularly wrong. It is always advisable however to connect the house service to the opposite side outlet at bottom of tank as shown in Fig. B.



The valves at the pump can then be set down to one, using a regular stop and waste cock on house supply pipe. When too many valves are to be operated on the supply side of the system, there is a danger of some being left shut or open when not necessary, whereas the stop cock is seldom touched unless some repair has to be made to the taps on the plumbing.

While speaking of this matter, it might not be out of place to mention a very important point in connection with pneumatic water systems.

It would easily be within the mark to say that 99 per cent. of these systems are connected direct to the range boiler as shown in Fig. 1, and while it is not an absolutely wrong method it could and should be improved. For instance, most of these systems are operated at from 25 lbs. to as high as 70 lbs. pressure per square inch, which means that the range boiler is also subjected to this variable pressure. Now, because of the fact that most range boilers are subjected to a cold water pressure test of 150 to 200 lbs. those persons installing these boilers in both city, town and rural districts, assume that such pressures as 25 to 70 lbs. are not excessive. This assumption is wrong.

There has been more trouble these last few years with range boilers giving out than ever before, and why? Simply because in years gone by range boilers were not as a rule connected direct to city or town pressure services, nor should they be.

A branch should be taken from the water service whether that service be a pneumatic water system or not, and run up to a tank, the highest fixture which requires to be furnished for supplying hot water, a large sized expansion tank fitted with a good grade of ball cock. Then a pipe taken from this tank should run to the range boiler. This latter pipe should never be less than ¾ inch, there would then be ample capacity to furnish two ½ inch pipes in case two taps were turned on at one time. It will be seen by adopting this method that a far less strain would be placed upon the range boiler.

Further than this, suppose the service at the pneumatic tank is temporarily turned off, there is no provision made for the hot water in the boiler expanding when a system is connected as shown in Fig. 1, and trouble is bound to occur if not considerable danger, whereas with a range boiler connected up with a supply and expansion tank, no such thing could ever happen.—Editor.

HOW TO CONNECT TWIN BOILERS TO EXPANSION TANK

Editor, The Sanitary Engineer.—Could you inform me in a future issue how you would advise connecting twin boilers up to an expansion tank, so that, in case one boiler was shut off, complete expansion would be provided for the other boiler?

A NEW READER.

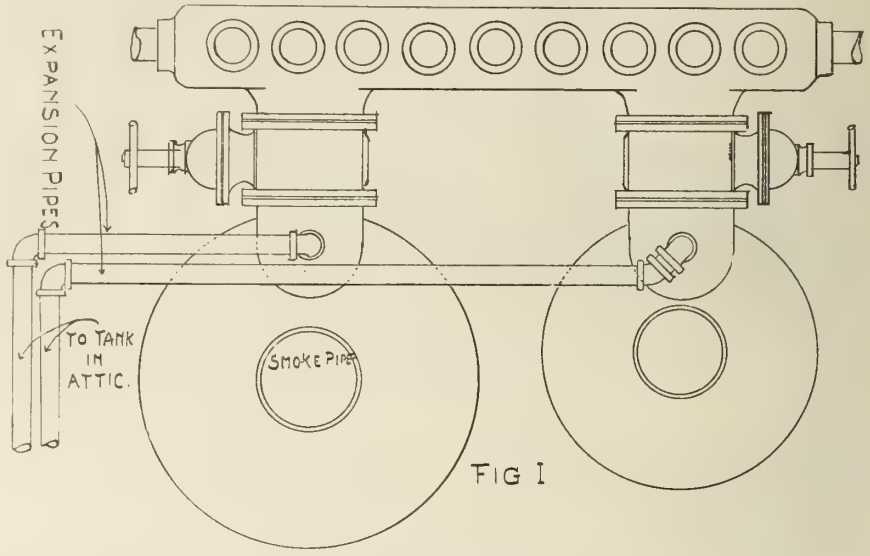


FIG I

Fig. 1 shows how expansion pipes should be fitted to boilers. These expansion pipes should be run independently to the expansion tank.

The common practice when only one boiler is installed is to take off a pipe from the return of a radiator near to the expansion tank. This was done about a year ago with twin boilers; one boiler was turned off and heat applied to the closed off boiler. Result—several thousand dollars damage. A connection such as shown in Fig. 1 would have been a safeguard against such an explosion.

New Canadian Patents

No. 164,269

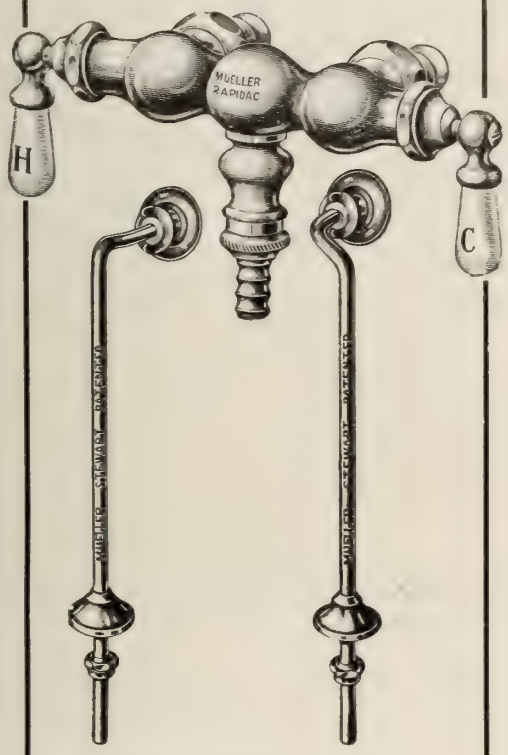
Herbert S. Humphrey, Kalamazoo Michigan, U.S.A., 10th August, 1915; 6 years. Filed 7th April, 1915. Receipt No. 250,304.

Claim.—1. The combination with a water heater comprising a water container and heating means, of a fuel valve, a water valve, means for normally closing said valves, a thermostat, operating connections for said thermostat to said fuel valve comprising a lever, a movable member constituting a fulcrum for said lever when actuated by said thermostat, a seat for said member, a cam by which said member is supported in its said seat, a rock shaft on which said cam is mounted, an arm on said rock shaft, a link actuated by said water valve connected to said arm, and a spring for returning said cam to its initial position.

2. The combination with a water heater comprising a water container and heating means, of a fuel valve, a water valve, means for normally closing said valve, a thermostat, operating connections for said thermostat to said fuel valve comprising a lever, a movable member constituting a fulcrum for said lever when actuated by said thermostat, a seat for said member is supported in its said seat, a rock shaft on which said cam is mounted actuated by said water valve, and a spring for returning said cam to its initial position.

3. The combination with a water heater comprising a water container and heating means, of a fuel valve, a water valve, means for normally closing said valve, a thermostat, operating connections for said thermostat to said fuel valve comprising a lever, a movable member consitituting a fulcrum for said lever when actuated by said thermostat, and a cam arranged to act on said member, said cam being actuated by said water valve.

4. In a water heater, the combination with a water heater comprising a water container and heating means, of a fuel valve, a water valve, means for normally closing said valve, a lever acting on said fuel valve, a thermostat mechanism including a member acting on said lever, a movable member acting on said lever and constituting a fulcrum therefor when the same is acted upon by said thermostat, and operating connections for said water valve to said movable



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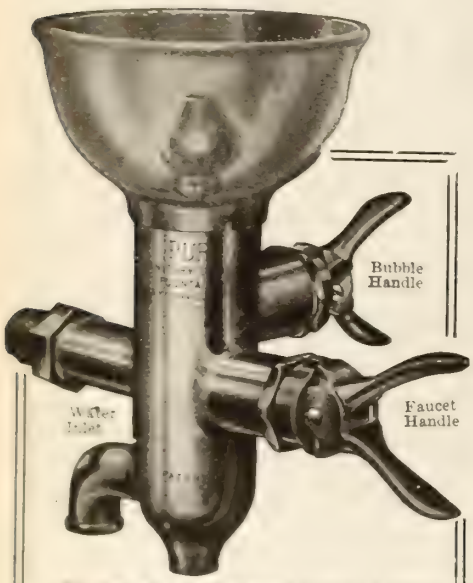

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member whereby the same is actuated by the opening of the valve, the combined action of the water actuated valve and thermostat being required to open the gas valve.

5. The combination of a water heater comprising a water containing and heating means, of a fuel valve, a water valve, a thermostat, operating connections for said thermostat to said fuel valve comprising a lever, and a movable member constituting a fulcrum for said lever when actuated by said thermostat, said movable member being actuated by said water valve whereby the thermostat is operative to open the gas valve only when the water valve is opened.

6. A controlling device for water heaters comprising in combination, a water valve, a gas valve, means for normally closing said valves, a thermostatic control means for said gas valve comprising a lever, a moveable member constituting a fulcrum for said lever when it is actuated by said thermostatic controlling means, and operating connections for said water valve to said movable member.

* * *

No. 164,748

William Anderson, Newport, Fife, Scotland, 7th September, 1915; 6 years. Filed 11th January, 1915. Receipt No. 246,867.

Claim.—1. In ball cock cisterns, the combination with a tank having a suitable outlet and valve seat, of an exit valve engaging said seat, a suction valve co-acting with said exit vale, a rocker arm, means exerting constant pull on one end of said arm, links connecting said suction valve to said arm intermediate of its length, and means for rocking said arm.

2. In ball cock cisterns, the combination with a tank having a suitable outlet and valve seat, of an exit valve engaging said outlet and having a central stem hole, a suction valve having a stem extending through said stem hole, said stem having a passage therethrough, a tubular member extending downwardly from said outlet, a relief pipe extending through the wall of said tubular member and bent downwardly at the inner end, and means for operating said suction valve.

* * *

No. 164,665

Ira A. Mann, Pittsburgh, Pennsylvania, U.S.A., 31st August, 1915; 6 years. Filed 7th May, 1915. Receipt No. 251,510.

Claim.—The combination with a bowl having an upwardly directed outlet passage with an opening through the wall of the bowl opposite the lower end of the passage and having a flushing supply passage leading to a point adjacent the said opening, of a removable solid closure plug closing the said opening and provided with a jet member pointing up the said outlet passage and communicating with the said supply passage in bowl.

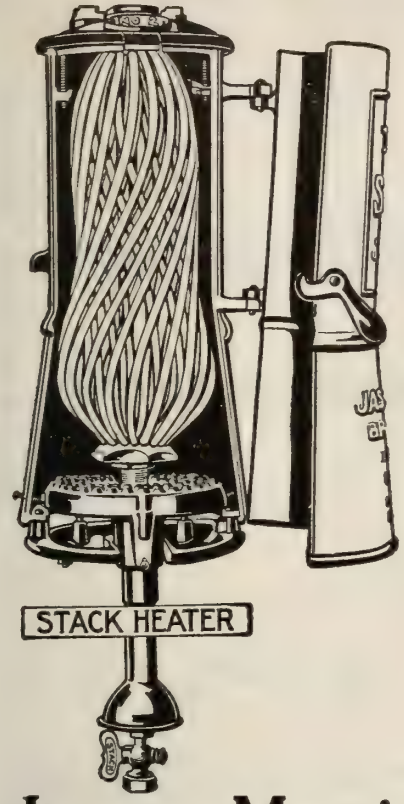
2. The combination with a bowl having within its walls an upwardly extending outlet passage and a flushing supply passage leading to a point opposite the lower end of the outlet passage, the said bowl also having an opening through its wall opposite the lower end of the outlet passage of a solid removable closure plug for the said opening, and a removable jet means opposite the plug and communicating with the said supply passage.

3. The combination with a bowl having within its walls an upwardly extending passage and a flushing supply passage leading to a point opposite the lower end of the outlet passage, the said bowl also having an opening through its wall opposite the lower end of the outlet passage, of a solid removable closure plug for the said opening, and a hollow jet plug carried on the inner side of the plug with its interior communicating with the said supply passage.

4. The combination with a bowl having within its walls an upwardly extending outlet passage and a flushing supply passage leading to a point opposite the lower end of the outlet passage, the said bowl also having an opening through its wall opposite the lower end of the outlet passage, of a solid removable closure plug for the said opening, and removable jet means comprising a jet plug carried by the closure plug, and having an opening through its central portion, and having its periphery spaced away from the opening in which it is mounted providing an annular jet opening, the said openings around and through the plug communicating with the said supply passage.

5.—The combination with a bowl having within its walls an upwardly extending outlet passage and a flushing supply passage leading to a point opposite the lower end of the outlet passage, the said bowl also having an opening through its wall opposite the lower end of the outlet passage, of a solid removable closure plug for the said opening, and removable jet means comprising a plug carried by the closure plug having its periphery spaced away from the opening in which it is mounted providing a circumferential jet opening, the said opening around the plug communicating with the said supply passage.

6. The combination with a bowl having a flushing water supply passage within its walls, and an upwardly directed outlet passage with one of the outer walls of the bowl opposite the lower end of the discharge passage, of an imperforate removable flushing plug extending through the said wall, and having a passage on its inner side connected to the flushing water supply passage in the wall of the bowl, and having its discharge end directed up the said outlet passage.



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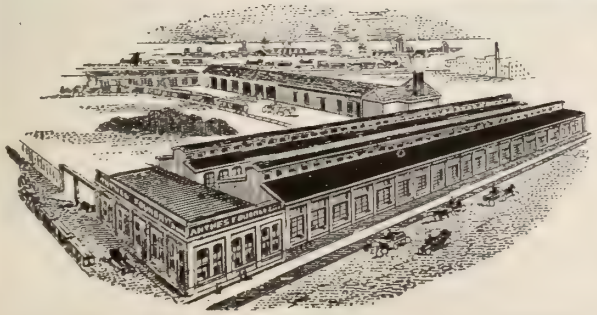

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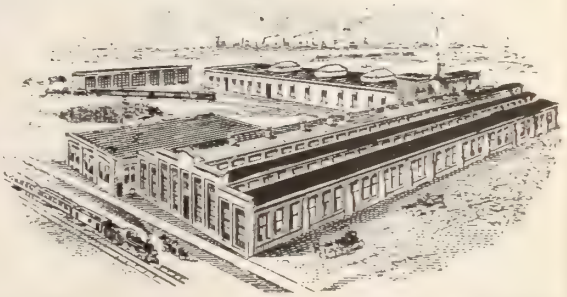

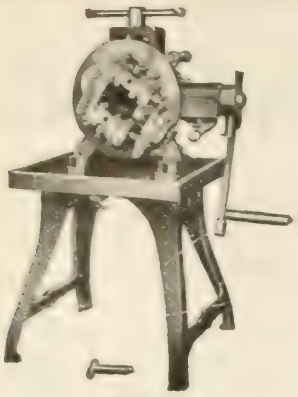

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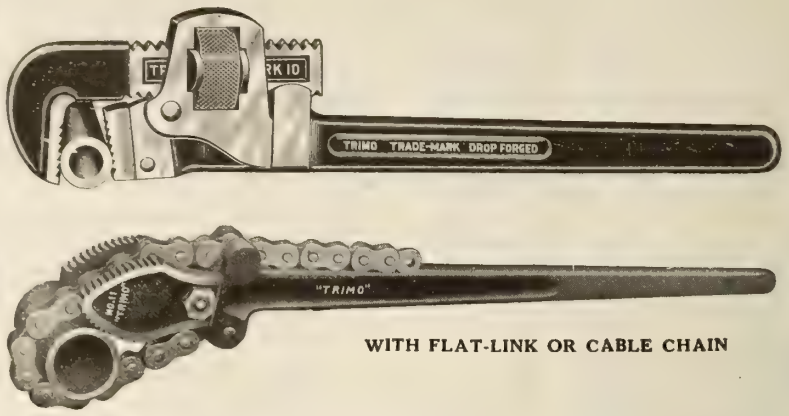

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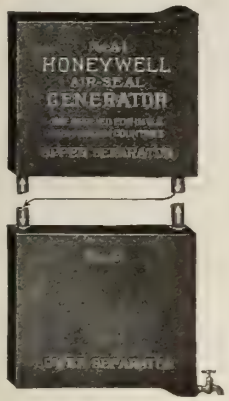

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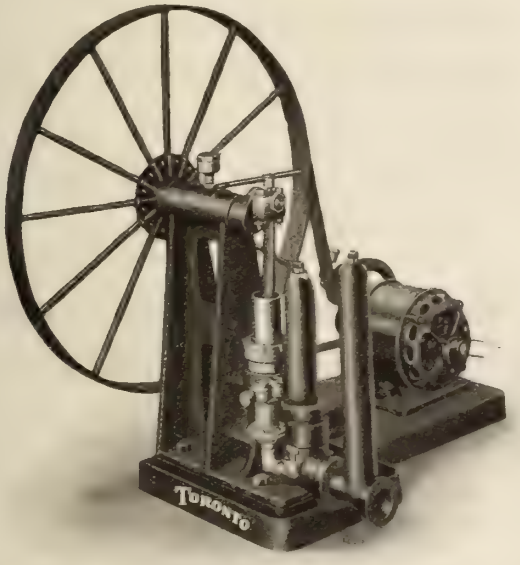

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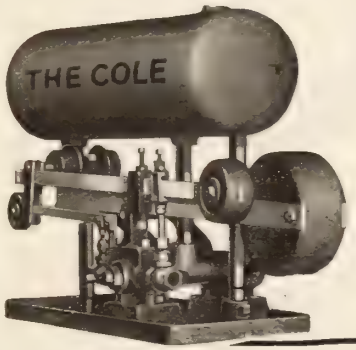

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Operate on roller bearings, on a fixed Fulcrum which permits of full discharge at each operation.

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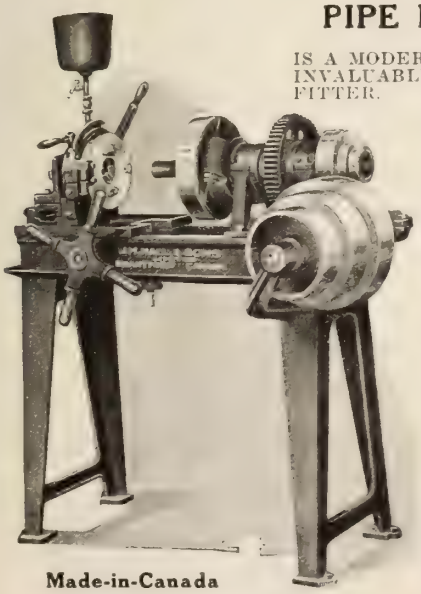
Save TIME and PIPE and CUT TRUE THREADS

THE HALL NO. 2 PIPE MACHINE

IS A MODERN TOOL THAT IS INVALUABLE TO THE PIPE FITTER.



Built in Canada for a maximum amount of accurate and efficient service to Canadians, and they cost less than imported machines.

Capacity, ¼-in. to 2-in. pipe. Nipples, ¼-in. to 2-in. Bolts, ⅜-in. to 1½-in. Hand, Belt or Motor drive.

Only one of the many sizes manufactured by us.

Ask the user about Hall machines — we'll gladly furnish you with names.

Prompt delivery from stock.

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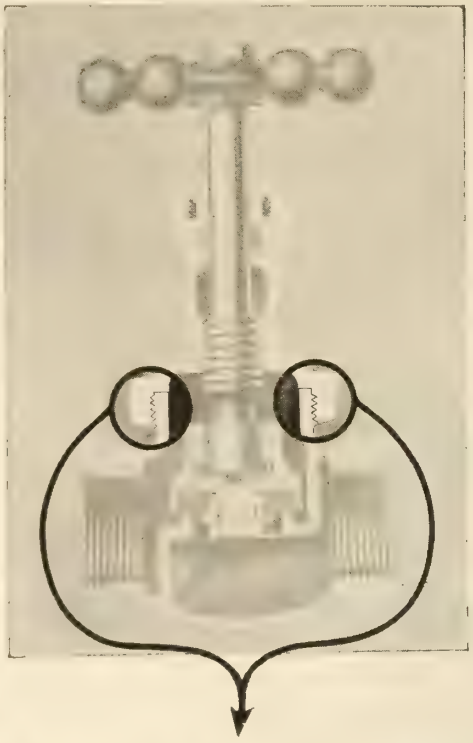
PENBERTHY TRADE MARK

BRASS VALVES

"QUALITY FIRST"

The name COMPODISK is cast on every valve



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OUTSIDE THREAD CONSTRUCTION

STRONG WHERE OTHERS ARE WEAK

Some of the Advantages

1. The connection is non-corrosive because the **threads** (see cut) are on the outside, away from the action of steam and water, making it impossible for them to become limed up and corroded.
2. The connection is stronger, more rigid and always steam-tight.
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6. It is the only correct mechanical method of fastening bonnet to body of valve.
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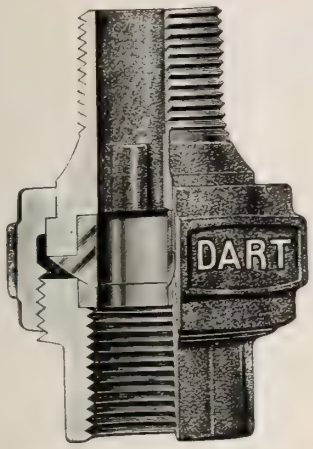

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Invaluable where several fixtures are to be branched off main lines of piping

SAVES ONE NIPPLE, OR PIECE OF PIPE AND TWO THREADS

No close nipple required when this fitting is used. A real two-in-one fitting with only two threads in place of four and a nipple.

Saves time. Only one fitting to stock instead of two.

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WORKS AT WALKERVILLE, ONT.

If you are new at the game, we invite you to "get wise" to this line of valves. Our catalogue No. 5, is yours for the asking.

You don't experiment when you buy Kerr valves.

We paid for the experiments long ago.

The Kerr Engine Company

Limited

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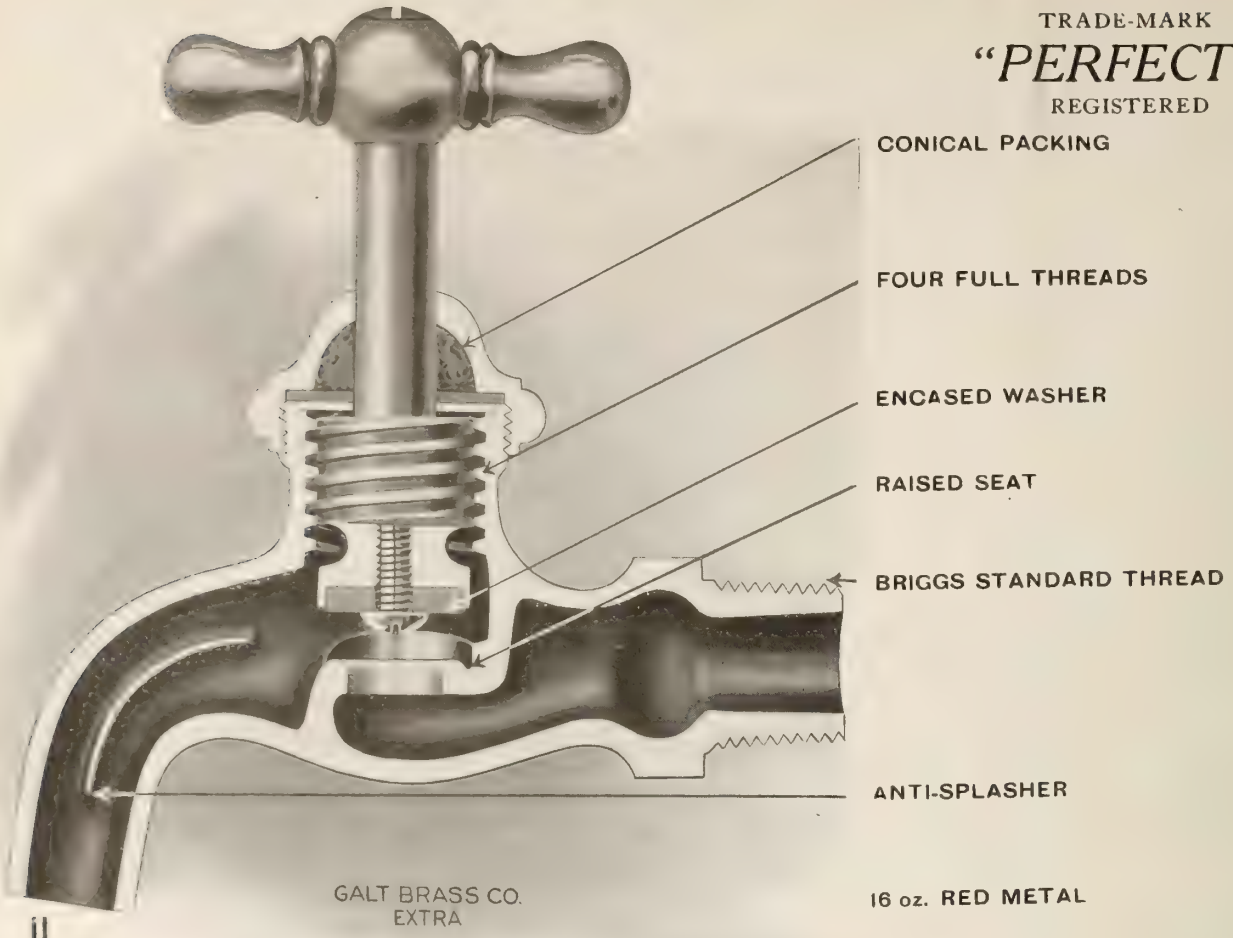

The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

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Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

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Galt, Canada

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PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

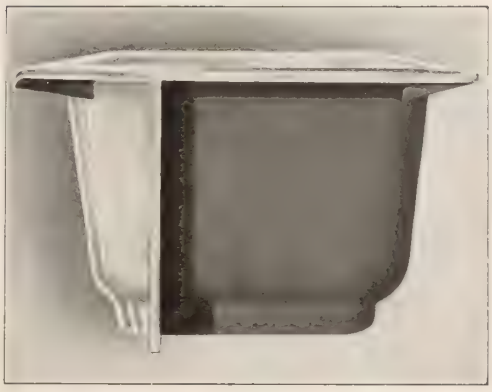
Vol X. Publication Office: TORONTO, MAY 15, 1916 No 10.

Enameled All-over

VICTOR ONE-PIECE BATH

Enameled Inside

The principle of the Victor Bath is a tub body cast integral with a Base and Wing Plates: the latter in various positions on the Tub Body to make the various Combinations, viz.:



Open Type
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Back to Wall Type
Also with Extension Rim at End or Back for fittings—thru rim.

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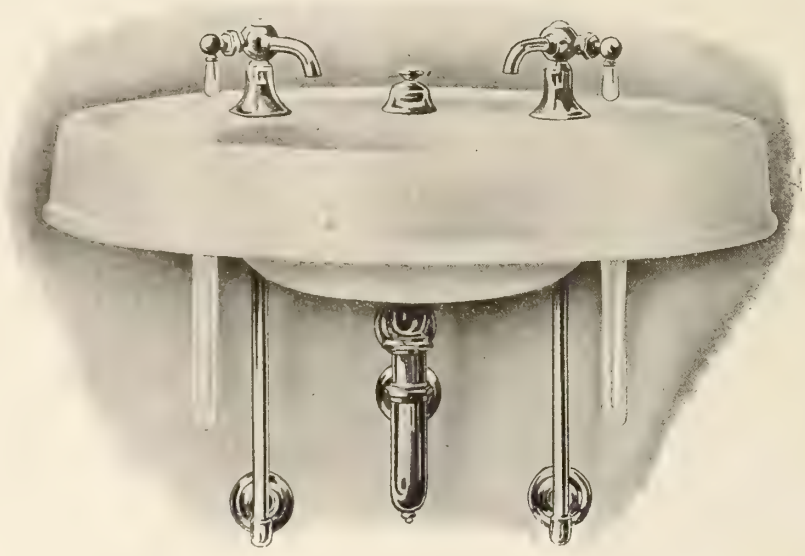

This is only one of the many attractive styles of Beaver Brand Basins. All have that pure whiteness of color which makes them a favorite among the people.

A sample will convince you of their durability and finish, which is second to none.

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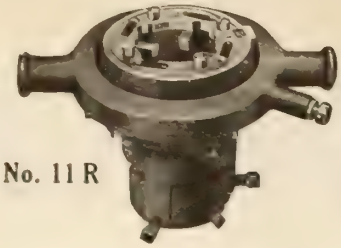

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Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely enclosed, excluding chips and dirt.

YOU CAN REDUCE THE LABOR OF PIPE THREADING 50 PER CENT., AND MAKE THREADS AS CLEAN AND PERFECT AS IF CUT ON A LATHE WITH ONLY ONE CUT WITH

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We'll gladly supply the names if you wish to have a chat with users in your town.

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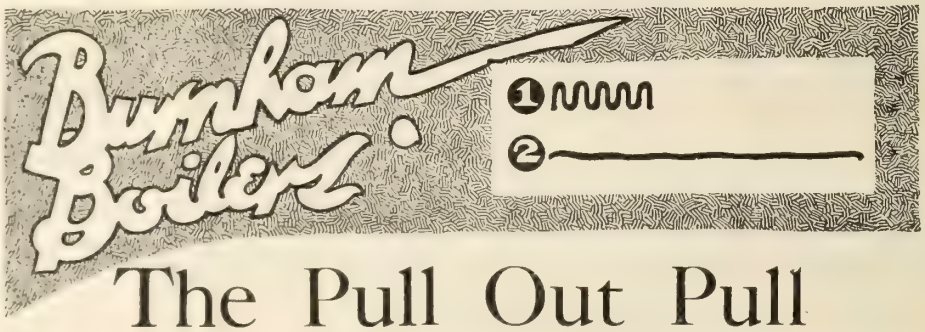

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A Way To Explain Economy

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In fact you do.
But translate it into every-day language—and they brighten up.
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It's little, homely, every-day explanations like this that help you sell Burnhams.
Our catalog has at least 7 just such helps. Send for it. Be posted on the Burnham Business Boosters.

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OF CANADA
Boiler Dept.

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The ball with the reinforced top which makes elongation impossible.

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JENKINS BROS.' VALVES

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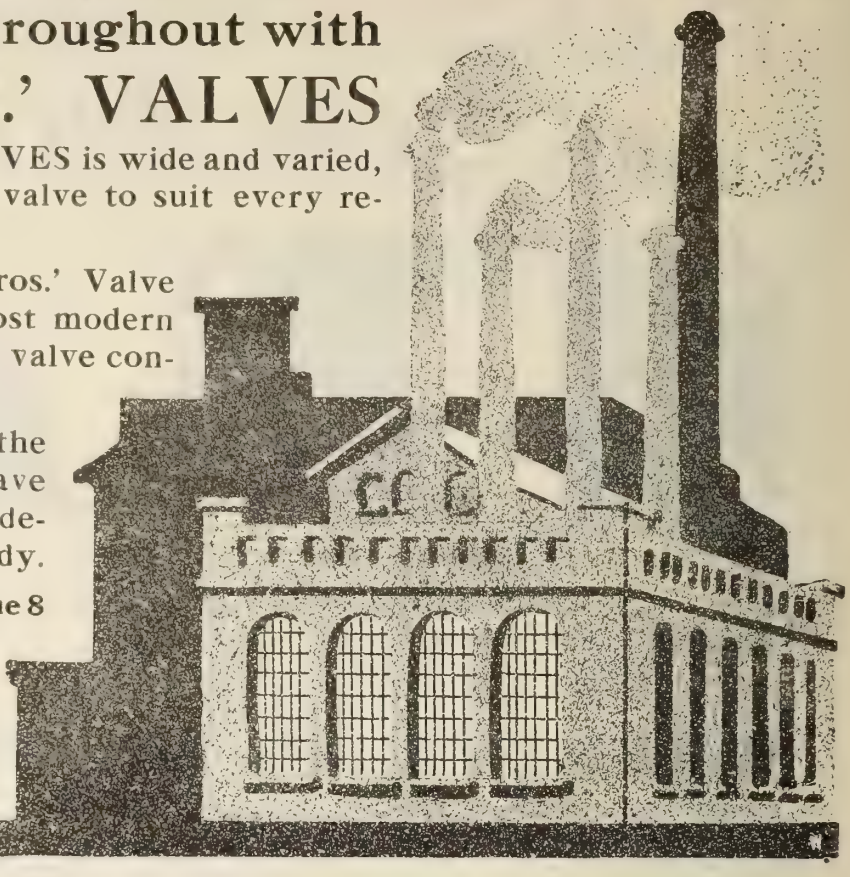
Every Jenkins Bros.' Valve embodies the most modern improvements in valve construction.

Be sure that the valves you buy have the Diamond trade-mark cast on body.

Write for Catalogue 8



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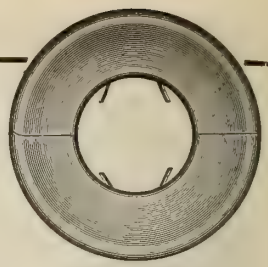

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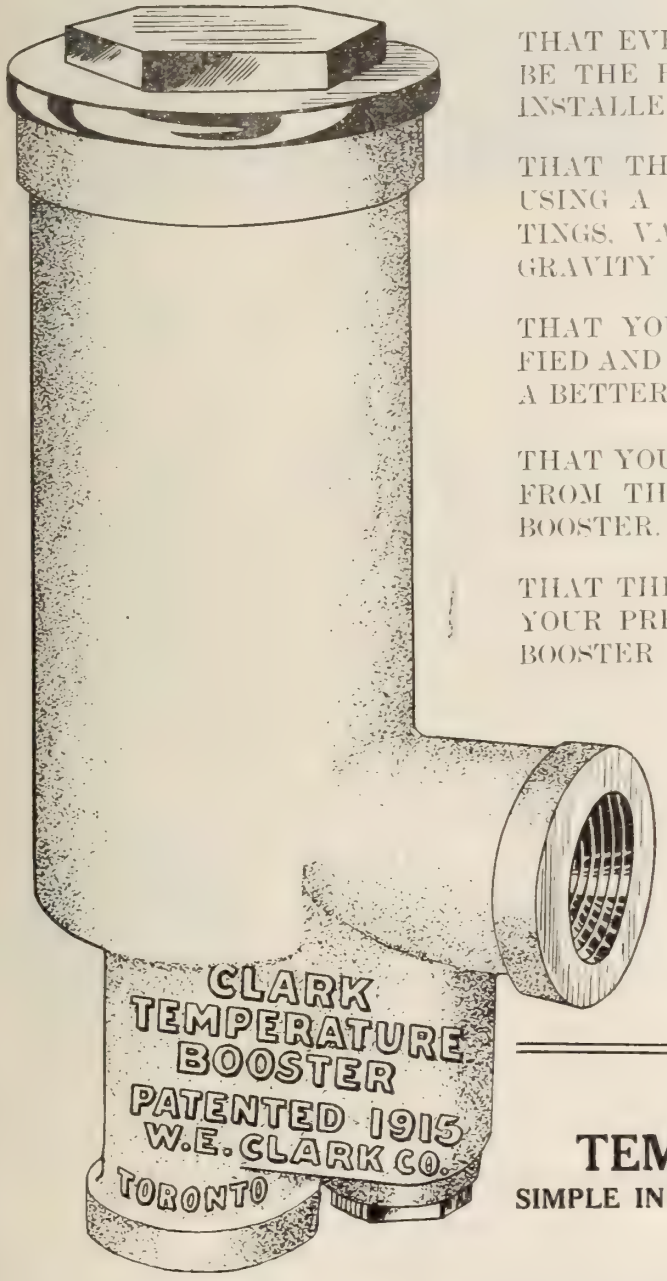

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SANITARY ENGINEER

PLUMBER AND STEAMFITTER OF CANADA

Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, MAY 15, 1916 No. 10

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EDITORIALS

Overhead Expenses—How We May Unite—The Metal Situation.

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THE SANITARY ENGINEER

VOL. X. MAY 15, 1916 No. 10

Positive Overhead Expenses

No Subject is so Interesting as That of Overhead Expense and Few Subjects are as Little Understood. The True Definition of Overhead Expenses Explained

By One of Us.

I VERY much doubt if there is another question in the sanitary and heating engineering business which has been more discussed than that of overhead expenses.

And why should this be may I ask? Simply this, that while one person has maintained that such and such an item was an overhead expense, another would assert that it was not.

A few days ago I became very much interested in listening to one or two grocers discussing overhead expenses, and thought that I might be able to glean some few points about this vexed question. One of these men was finally asked to give some of the items in detail of what he considered to be legitimate overhead expenditure. And amongst the many which were of course actual overhead expenses were included some altogether out of the question:

Life insurance.

Association dues.

Expenses in connection with the annual convention.

Donations to charitable institutions.

Subscriptions to daily and trade paper.

Profit and loss account.

And strange to say none of the party seemed to take any exception to the inclusion of these items in overhead expenditure.

To hear a number of grocers willing to charge such items up to overhead reminded me of a sanitary and heating engineer who said that he charged all his gasoline, cutting oil and putty in his overhead.

This led me to try and think out some few words which would properly define what overhead expenditure really is, not what we should charge to such an account, and this was the result:

An item of overhead is an expenditure which must be paid whether I do 10 cents worth of business or $10,000, in any given period, preferably a year.

For instance, if I never used the torch or lamp I'd use no gasolene. How could this item be an overhead expenditure? Though I may do $1,000 worth of business in a week, there'd be no gasoline to charge up. Or, on the other hand if I never cut a thread I would use no cutting oil in that time, so oil and gasoline cannot possibly be charged to overhead but must be charged under the head of "material used."

In the case of the grocer I would never think of charging life insurance up to overhead. It's none of my customer's business whether I'm insured or not, why should I charge him with my life insurance expenditure?, and he certainly should not be asked to donate the money I give away to charitable institutions. All business men must be just to be generous. And if I'm not earning sufficient money to warrant these donations, I should not incur them, they are expenditures of a private character.

One member of the craft asked me what I would charge railway expenses to, which were incurred by his going to the city to buy material. For instance, said he, "I found if I come to the city I can buy better and cheaper than if I order from the travelers."

I replied that such an expenditure should by all means be charged to cost of material, just as the freight charges are. "But," I added, "there's a screw losse somewhere if you have to spend both time and money in this way."

Another member of the craft stated that the reason why he could do a job so much cheaper than his fellow competitor on the next block, was because (said he) "I've no rent to pay, I own this property you know, and So and So has rent to pay." Such an argument is simply childish.

Most young fellows starting in business for themselves think that if they work a few hours a day longer, they can get ahead of the game.

What a foolish idea. The man who works at the trade on his own account should charge his business with the time he put in on it, and he'll soon see that if he'd been working for a boss, he'd be better off.

The main idea is to be able to cut down all unnecessary expenditure, yet at the same time clearly define what overhead expenses are.

Gasoline is material, so is threading oil, and both these items should be charged to the job they are used upon. But a personal life insurance policy should be paid for out of personal salary appropriation.

By including all such expenses as above mentioned, one member of the craft declared that his overhead ran up to 40 per cent. and to charge 40 per cent. on his selling price would be suicidal.

One feature in this connection which is bound to bring good results is this. If by giving this question of overhead expenses a certain amount of serious thought, the craft can see where a number of expenses can be eliminated, then the time will not be long when not only legitimate overhead expenditure will be provided for but a profit will be made as well.

MOST CITIES LACK PUBLIC COMFORT ACCOMMODATION

Most cities on the North American Continent—many of them considered beautiful—are well supplied with hotels, restaurants and saloons, which men, women, girls and boys are too often forced to make use of because of the absence of necessary public comfort stations. Of course, stores and railroad depots are expected to and do provide many such conveniences for their patrons—be it said to their credit. Should a city be less considerate of its citizens and visitors? Should these institutions be forced to provide such conveniences? Can they afford to keep the toilet facilities and surroundings up to the highest standard of cleanliness and sanitation? Again, if as medical authorities claim, many dangerous and contagious diseases common to-day are directly traceable to such sources, is it not a community sin for any city or town to neglect to provide public comfort stations fitted up with the latest approved sanitary appliances?

New Toronto Technical School

Specifications Described, Previous Articles Merely Mentioned the Equipment in a General Way—Plans and Layout Will be Described, Making the Following Articles Doubling Interesting.

Sanitary Engineering

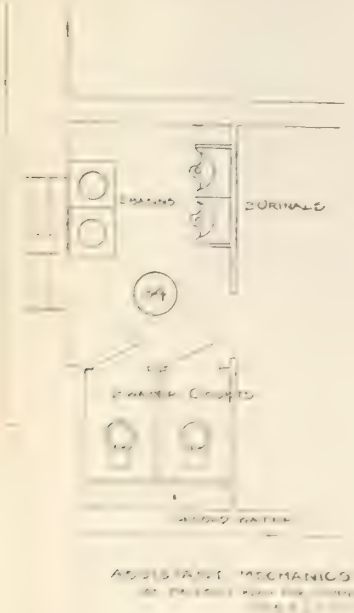
PREVIOUS articles describing the Toronto Technical School merely dealt with the plant and educational equipment in a general way. No specifications to speak of were mentioned except, of course, when describing a piece of machinery, etc.

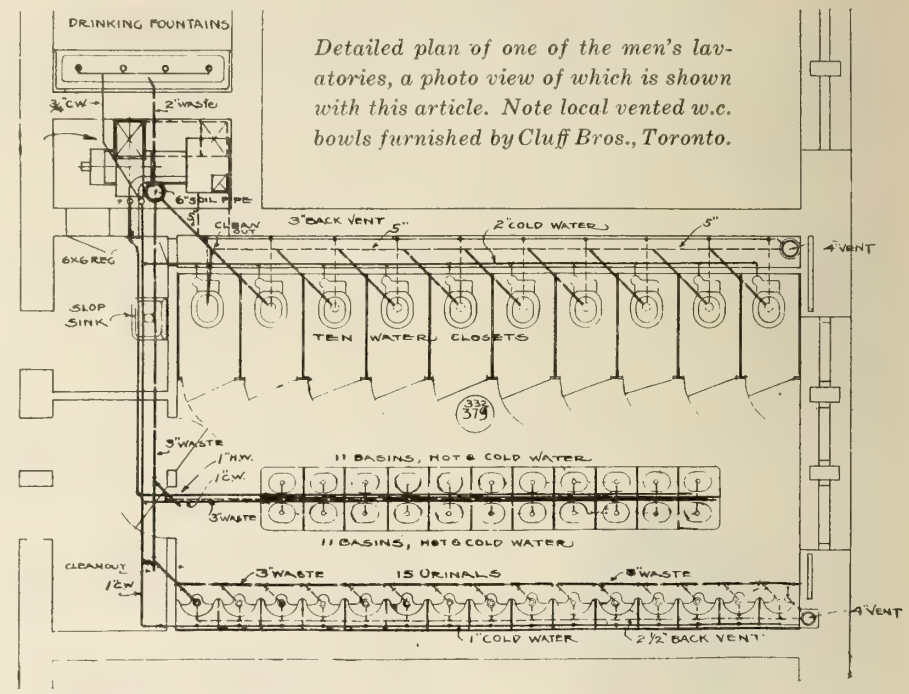
The following articles will deal with the constructional specifications, such as weight of pipe and size, and the way it is defined. It will be noted that every item is specified in such a clear manner that only one construction could be placed upon it.

For instance, section 15 of the plumbing specifications read as follows:

The contractor is to provide all pipe, bends, fittings, traps, lead, etc., necessary to instal and connect; complete all fixtures and drains hereinafter specified and shown on plans; following the plans for locations of vertical risers, horizontal mains, etc., and making such changes in location as are necessary to clear beams and structural

The pipes and fittings shall be of cast iron, except where otherwise specified, and of the hub and spigot pattern, sound cylindrical and smooth, free from sand holes, cracks, or other defects. Only untarred pipe and fit-





Detailed plan of one of the men's lavatories, a photo view of which is shown with this article. Note local vented w.c. bowls furnished by Cluff Bros., Toronto.

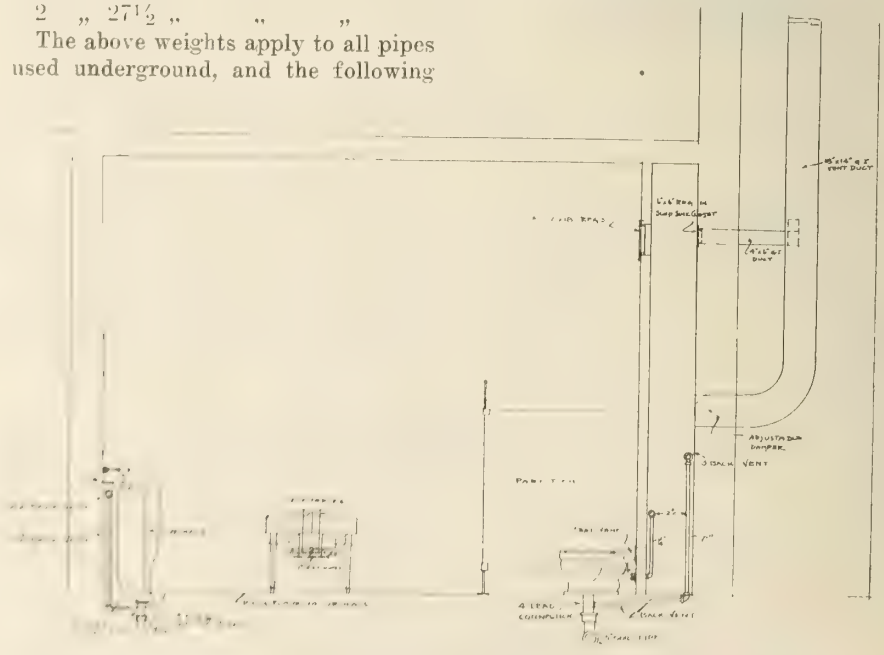
cast iron pipe and fittings are to be of size on plans and of weights as follows:

8-inch, 170 lbs., per 5-ft. length.
6 „ 100 „ „ „
5 „ 85 „ „ „
4 „ 65 „ „ „
3 „ 47½ „ „ „
2 „ 27½ „ „ „

The above weights apply to all pipes used underground, and the following weights may be used in vertical pipes in only sizes specified:

4-inch, 45 lbs., per 5-ft. length.
3 „ 30 „ „ „
2 „ 20 „ „ „

When the question of caulked joints had to be considered, it meant quite an



Sectional view of men's lavatory, illustrated in plan and photographic view.

A section of one of the men's lavatories. A battery of 10 w.c.'s and 15 urinals.

item in lead alone, and if a little more oakum were to be used, the saving in lead would have amounted to a considerable quantity in such a building.

Even the amount of lead and quality was strictly specified and adhered to in every particular.

Section 16 took care of this matter in the following manner:

Connections between lead and iron pipes shall be made with brass thimbles or ferrules, having wiped joints, and the ferrules shall be properly gasketted, leaded and caulked into the said pipe, using oakum and molten lead.

Joints to be made impermeable to gases by bedding the lead with hammer and caulking iron. All lead for caulking to be pure soft pig lead.

One pound of lead shall be used to each joint for each inch in diameter of pipe.

Ferrules must weigh as follows:

For 4-in. pipe, not less than 2½ lbs.

3-in. pipe, not less than 1¾ lbs.

2-in. pipe, not less than 1½ lbs.

Each ferrule to be not less than four inches in length; all joints in lead pipe to be properly wiped.

Of course, the whole sanitary engineering installation had to be constructed in accordance with the City of Toronto plumbing by-law, and, in addition to the city inspection, a practical engineer was constantly on the job.

Roof Flashings, etc.

The roof terminals were all well flashed with copper, and the rain water leaders, too, as well as copper wire baskets or screens over the rain water leaders.

Where any underground pipes were laid upon ground that had previously been disturbed, a brick or concrete foundation or support had to be provided.

Cold Water Services

The water services consisted of two 4-inch pipes, one entering at the front, the other at the rear, and stop as well as waste valves were provided.

These mains had to be extended through certain portions of the building, and 4 x 2-inch tees had to be provided on these mains, from which the various distributing mains were taken.

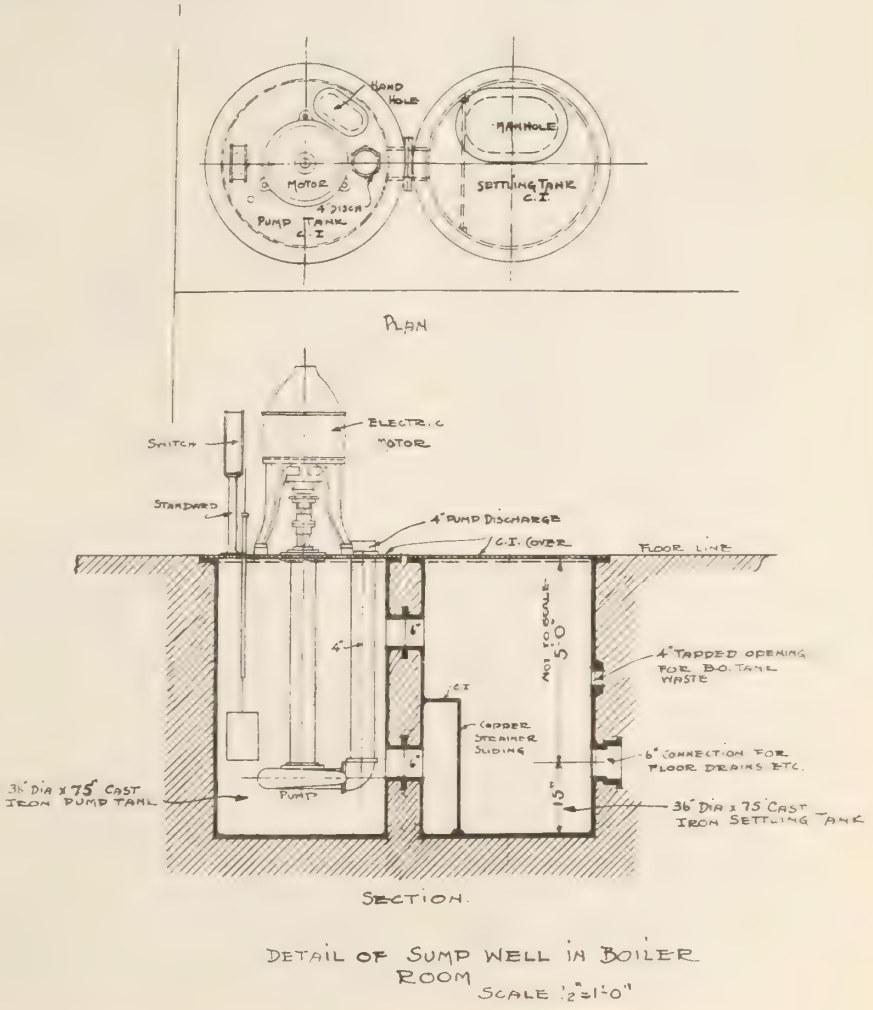
Hot Water Service

The contractor had to start at the hot water tanks, which were furnished by another contractor, and run mains to all fixtures.

The hot water piping installed is of the best grade semi-annealed brass pipe, iron pipe size. Three-quarter-inch circulating pipes were also furnished and connected to the tanks. All exposed pipe in connection with the various fixtures are nickel-plated brass, iron pipe size, and the best grade of fixtures are installed throughout the building.

By this, however, it must not be construed that expensive, elaborate fixtures were provided. Such an expenditure would have been superfluous, but where service and durability had to be considered, quality was furnished.

(Continued in next issue.)



DETAIL OF SUMP WELL IN BOILER ROOM
SCALE 1/2"=1'-0"

Rural Sanitation

A Continuation of the Sanitary Science Course That Has Been Appearing in the Sanitary Engineer, But Having Particular Reference to the Sanitary Disposal of Household Wastes in Unsewered Districts

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 3

THE bacteria that [illegible] the soil principally confined, as previously explained, within the first [illegible] below the surface are of various kinds, but the greatest number are rod-shaped, the bacilli. Where plenty of air is available, the aerobic (living with air) bacteria are found, while where the soil is not sufficiently aerated are found the anaerobic (living without air) bacteria, whose action is not generally so beneficial as the aerobic. In a swamp or muskeg the soil being water-logged cannot get sufficient quantities of air for the action of aerobic bacteria. The resulting anaerobic bacterial action causes putrefaction rather than decay. The soil becomes acid and humus is not formed as in ordinary soils. The soil bacteria that change sewage into harmless compounds need air and an alkaline soil—just as is required for agricultural purposes. In farming, air-slaked lime or limestone is often added to the soil to keep it from becoming acid, which would prohibit the [illegible] desirable bacteria.

Carbon, hydrogen, nitrogen, oxygen and sulphur are five chemical elements that are found combined to form proteids. Combined with water, they form the greater proportion of what is known as protoplasm, which substance fills the cell or cells of the smallest bacteria or the largest plant or animal. Phosphorus and mineral salts are also necessary in small quantities, but these five elements may be considered the primary essentials in plant or animal. $C_{72}H_{112}N_{18}O_{22}S$ is a [illegible] formula for proteids expressing [illegible] chemical composition as closely [illegible] by as it can be determined or expressed. This formula illustrates the relative amounts of the different elements, and shows in particular what a small amount of sulphur is present.

[illegible] proteids and smaller amounts of fats [illegible] (the two latter being [illegible] er it may be, by bacterial [illegible] there are none or very [illegible] as on the desert or moun- [illegible] arrested as in or near [illegible]

bodies would accumulate and eventually clutter the earth. Many thanks are due to the numerous soil bacteria which, under ordinary conditions, perform their useful sanitary tasks.

If plenty of air is available for the aerobic bacteria then the different elements in the proteids, fats and carbohydrates are fully oxidized as decomposition takes place:

C—Carbon becomes carbon dioxide gas—CO_2.

N—Nitrogen becomes nitric acid—HNO_3.

H—Hydrogen becomes water—H_2O.

S—Sulphur becomes sulphuric acid H_2SO_4.

The acids of which nitric is formed in by far the greater quantities, are neutralized in alkaline soils—nitrates of calcium, for example, being formed where lime is present. Such nitrates when dissolved by the soil water are ready to be used by the plant in getting its necessary supply of nitrogen.

If, however, air is limited the anaerobic bacteria cause the decomposition of proteids, fats and carbo hydrates with the liberation of many gases, some of which are inflammable:

CO_2—Carbon dioxide gas.

H_2—Hydrogen gas.

N_2—Nitrogen gas.

CH_4—Methane or marsh gas.

H_2S—Hydrogen sulphide (in small quantities but an evil smelling gas).

The carbon needed for plant life is got entirely from the carbon dioxide gas in the air, of which it forms from three to four parts per thousand by volume. As carbonaceous matter in plants it is eaten by animals and returns to the soil as excreta or as dead animal or plant matter. Here in decay or decomposition the carbon is formed into carbon dioxide gas and returned to the air. Another way of return is, of course, from the breath exhaled by animals which contains a comparatively large amount of carbon dioxide. The average human being exhales about seven-tenths of a cubic foot of carbon dioxide gas per hour. But the most complex change or cycle is that concerned with nitrogenous matter or matter containing nitrogen. Plants can get nitrogen only in the form of nitrates from the soil. When the decomposition of nitrogenous matter (formed from dead plants, animals, etc.) takes place in the soil the nitrogen is first formed into ammonia by certain bacteria, some of which are shown in Fig. 6. Then if air is present by bacterial action nitrites are formed which by further and different bacterial action are changed to nitrates (see Fig. 7).

Sewage contains nitrogenous and also non-nitrogenous carbonaceous matter.

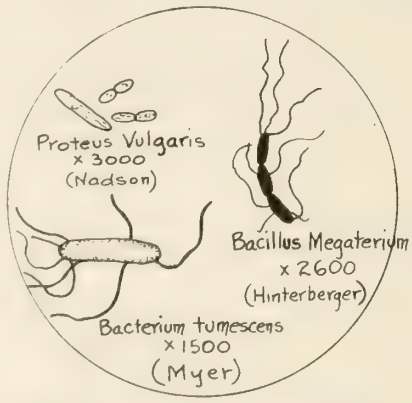


FIG 6. AMMONIFYING BACTERIA

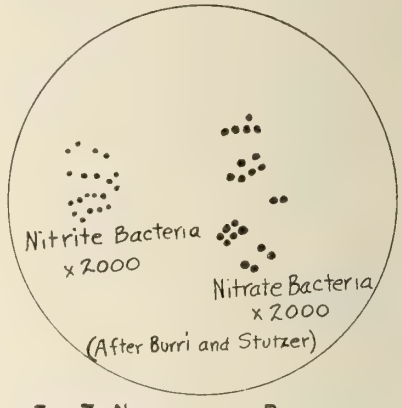


FIG 7. NITRIFYING BACTERIA.

In the intestines of human beings the excreta consists of partly digested nitrogenous matter with vegetable non-nitrogenous residues of food with millions of bacteria of different kinds which often cause a certain amount of putrefaction in the large intestines if such matter is held there too long. Poisonous gases thus evolved may be absorbed in the systems of people troubled with constipation. Mixed with urine (largely urea) and paper (cellulose) the fecal matter when carried away with water is termed sewage.

Some of the bacteria present in sewage are the same as those found in the

soil, as for example, proteus vulgaris, B. megaterium, and B. myocides. Such bacteria soon form ammonia principally from the urea of the urine. The dissolved oxygen in the water carrying the sewage is quickly used up in oxidizing, through bacterial action, to some extent the various organic matters. What is next needed, then, is more oxygen to allow of further oxidation so that what is known as stable compounds may be formed (example nitrates) which are not subject to further decay or possible putrefaction but are ready to be used for plant growth.

The objection to sewage apart from its unpleasantness to the various senses is that it contains disease bacteria, and unless properly treated becomes a breeding ground for such disease and other objectionable bacteria. Treating sewage with chemicals may kill all disease bacteria present, but it also arrests the action of bacteria that would help change the sewage into unobjectionable matter and it remains a home for objectionable bacteria which find their way to it just as the seeds of weeds find their way to a newly ploughed field.

In the soil there is found, more frequently in Southern climates, the tetanus or lockjaw bacillus (see Fig. 8). This bacterium is an anaerobic organism living without air. It can enter the system through wounds made when in contact with the soil. A barefooted boy and an old nail in the soil are suitable conditions for a tragedy. When the bacteria get into the skin they manufacture poison which attacks the jagged ends of nerves which are connected with the brain. Muscles and particularly jaw muscles sometimes contract so violently that the bones are broken—hence the name lockjaw. In Belgium where the soil has been cultivated for years and years the soil is rich not only in beneficient bacteria, but also with bacteria that cause blood poisoning or other similar troubles for the soldiers wounded on the battle field and coming in contact with the soil. Hence although the soil contains bacteria that take care of dead organic matter, sewage, etc., it is not wholly kind to mankind in all instances.

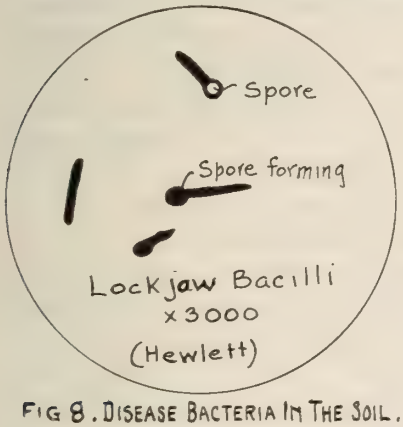


FIG 8. DISEASE BACTERIA IN THE SOIL.

The disease bacteria in sewage are from human excreta. They include typhoid bacteria (see Fig. 9) which in Canada is the most feared of water borne diseases. Staphylococci and streptococci are sometimes found and may cause minor diseases. The bacteria causing Asiatic cholera are rare in this country but organisms causing dysentery are frequently found in sewage. Hookworms and other parasitic worms are present in sewage in warm countries. One great object of sewage purification is to prevent these bacteria and organisms from being communicated to human beings either by contaminated water supplies, food or by other means.

It has been mentioned that what is needed in sewage purification is the oxidation of organic matter into stable compounds. Though this principle has been recognized for some time it has not till very recently been practicable to oxidize raw sewage without first settling out and getting rid of the solids in suspension. Mr. R. O. Wynne-Roberts in an article in the Sanitary Engineer of date October 1st, 1915, explained how the "activated sludge" process is revolutionizing sewage disposal treatment. Since that date the published reports of experimental plants furnish further proofs of its practicability. In the article "Activated Sewage Disposal Experiments," Mr. Wynne-Roberts briefly described the method as follows:—

"The activated sludge process is simple in one sense. It consists of blowing air through sewage until it is purified. This, in the first trial, takes about six weeks. Then a quantity of the water is syphoned out, the sludge kept back, and fresh sewage mixed with it. This is air-blown until it has lost its impurities. By repeating the process time after time, until the sludge amounts to about 25 per cent. of the capacity of the tank, the sewage can be purified in three or four hours instead of six weeks.

"The sludge must first be made active by blowing air; it will then be somewhat like yeast is to flour; it must be thoroughly mixed and allowed to do its work."

For many reasons it seems doubtful if the activated sludge process will ever be adapted to small disposal plants serving only one or a few homes. The attention such a plant would require is one of the main reasons against its use for small installations.

FIG 9. DISEASE BACTERIA IN SEWAGE.

The methods used for disposing of the sewage from homes in rural communities not served with a main sewer are in some cases modifications of methods which have been used on a large scale for cities and towns. The treatment of sewage before the activated sludge process became known or was experimented with consisted generally of two different parts or stages. The first was for the purpose of settling out the solids and, in some cases, liquefying the solids. This preliminary process or the removal of polluting matters in suspension was very frequently accomplished by means of septic tank. Other means have been employed and more recently the two-storeyed tank termed an Imhoff tank from its designer and also an Emscher took from the district in Germany in which it was first installed. The septic is, however, in general use in small plants with which these articles will be mainly concerned.

The second stage was a purification process by oxidation of organic matters in solution into stable compounds. Decomposed matters containing nitrogen were changed from ammonia to nitrites and then to nitrates. Such a process is termed nitrification so that in this last stage oxidation and nitrification are both referred to as being accomplished. In large plants this final purification was accomplished by various means. Sewage irrigation on land as a purification process was recognized in the 15th century and sewage farms since that time have been in existence. In the nineties the Massachusetts State Board of Health introduced the intermittent sand filtration method which is very successful where the soil is sandy or where plenty of sand is available. About the same time contact beds, consisting of porous or granular material were introduced in England. The beds were alternately filled and emptied allowing plenty of air for aerobic bacterial action. More recently the sprinkling or percolating filter has been used. The sewage is sprayed by different means on beds of porous or granular material and thorough oxidation results. Sewage farms and intermittent sand filters are what might be termed natural methods and depend on the cultivation of the bacteria naturally present in the soil. They cannot and have not recently been used for large cities or towns as the area required is very great. An acre of land will purify the sewage of only about 1,000 people by the intermittent sand filtration method while an acre of a modern sprinkling bed will take care of a population of 30,000 or thirty times as much.

(Continued in next issue).

THE SANITARY ENGINEER

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MAY 15, 1916

OVERHEAD EXPENSES

NO problem can receive as ready a hearing from the ordinary man in business as can the question of overhead expenditure. It is an expense which oscillates, is not constant, and therefore requires constant attention. The question, though, which is of greatest importance, is to get men to constantly watch this detail of their business, to become thoroughly conversant with all the pros and cons in this connection.

For instance, if a man never realizes how important it is to his business he does not comprehend that to neglect the question of overhead, is like trying to steer a ship without a rudder, on an everlastingly changing sea.

There are certain expenditures which must be provided for and there are others which are being provided for, but not by the actual business in which these expenses are incurred. For instance, two sanitary engineers are in business in a certain town. One owns the property. His father left it to him, and he has $5,000 invested in his business.

The other has to pay rent, and provide $5,000 working capital, by taking credit in either goods or personal loans for which he is paying 6 per cent.

The first man says: "I can beat my competitor every time." "you see I have no rent to pay and I pay cash in 30 days, get my discount, etc. This enables me to do a job cheaper." The other man says that such is the case, in other words he is trying to do a square business and can't see why he does not succeed. But here's the trouble. both these men know their business. One values property and money, the other does not. The one is quite willing, because he has it, to loan the public $13,000 for nothing, he could be getting at least 5 per cent. interest on his investment and never turn a hand. He could pocket $650 a year and invest that at another 5 per cent., which would really be a capital of $13,650 to invest at 5 per cent., and so he could go on at compound interest.

Now, this man with $13,000 is not figuring his overhead properly if he used it to put another man out of business, and the chances are he thinks he's doing a good stroke of business by putting $13,000 into his business and not getting any practical returns for it.

This is exactly what is happening. Here is another feature: There are hundreds of men who start in business with limited capital and work night and day, claiming that they can do a job so much cheaper because they do the work themselves, etc.

One man a few days ago was heard to say that if he were to charge more than a day's wages, he'd never get a job. No doubt that's true, but is it right? And because one man puts capital into his business and does not charge interest for it, is no just reason why another man puts his whole life into his business for mere bread and butter. Two wrongs never made one right and never will, and if the worker, who has the least to lose will consider this, the man with the money will also soon realize that it is a losing game. All that is really needed is to get together and reason the matter out. It can be done, and such a course would be far better than bartering one's very life and wealth for imaginary success. Neither party is just to himself, and the public are getting the benefit and do not even give the trade credit for it.

THE METAL SITUATION

THE majority of goods used by sanitary and heating engineers are in anything but a settled state. Pipe has again taken another raise. Brass goods are anything but settled. The price of cast iron enamel ware has been raised three times since the year turned, and galvanized and malleable fittings

have soared to 40 per cent. more than they were a year ago.

The question is, are members of the trade taking note of these conditions, are they being tempted to sell at low prices simply because prices were lower when goods were procured?

The writer came across an instance where a tender was submitted and accepted in which the goods, if bought to-day, would cost all told nearly 25 per cent. more than charged on the estimates submitted and the contractor felt he had made a good deal in procuring the contract.

Now is such a case good business or not? Suppose in a few months goods are still at a premium and this same contractor has to pay the high price; what is going to happen?

The question is resolved to this, should goods bought at a lower price be sacrificed in that way? We think not and our reason for so doing is simply this: Suppose goods were to drop below what they were before, the scarcity of metals became apparent, what will happen? If price of goods increase in price the merchant should protect himself and when prices decrease, goods should be sold at a lower figure. It is poor business to sacrifice goods on the one hand, then have to pay a higher price for more. The public would feel very much more secure and have greater confidence in the trade if all sanitary and heating engineers watched these points more thoroughly. Metal without doubt is money, and more so to-day than ever.

HOW WE MAY UNITE

IN these days when the very air we breathe seems to be filled with strife, it is refreshing to see in print anything which calls all mankind to unite for the common good. For instance, when the Red Cross appeals for funds, no party, religious or racial cry is heard. Everyone looks, as it were, into oneself, to see how much we can spare, not how little. In a word, all are united. It should be the same in our business; unity between employer and employee is the only road to success, and when they do not agree there are wrongs to be righted by either one or the other.

The following editorial which appeared in the *Toronto Daily Star,* of May 12, is well worthy of note, and without doubt should be inwardly digested by every Canadian and Britisher, in fact every human being:

"Many good citizens of Canada must feel depressed and anxious about the continual raising of questions which tend to divide us on racial and religious lines. But it seems useless to deplore or to protest. The true remedy is to get all the people interested in constructive policies. Instead of dwelling on those things on which we may divide, let us be zealous as to those things on which we may unite.

"We are all interested in the conservation of our national resources. We are all interested in increased production. We are all interested in the welfare of those who produce, in the fields or in the factory. We are all interested in the promotion of justice for the workers. As to these matters there are no racial divisions. When we think of men, women and children in these relations, we think of them as human beings, not as French or English, Protestant or Catholic.

"Pensions for the old, insurance for sickness and unemployment, compensation for injuries, regulation of child labor, provision for the health and comfort of factory workers—and especially of women—these are all questions of broad, human interest. They tend to unite all public-spirited men and women. So men and women take a broad, human interest in hospitals, in the care of the afflicted, in the care of children who are in danger of being neglected or abused.

"If we could get all Canadians interested in these questions of broad, human interest, the sectional questions would disappear. It would not be necessary to fight against sectionalism, because sectionalism, as a destructive force, would have to give way to constructive and creative forces. We would pay less attention to those matters on which we disagree, because of our absorbing enthusiasm and zeal in matters of common, human interest.

"Co-operation is the remedy for conflict. Constructive effort is the remedy for destructive tendencies."

It is doubtful whether more fitting lines could have been written at this time. They breathe the real spirit of the Fatherhood of God and the Brotherhood of Man.

If the little ants were not united, there'd be no ant hill. It is just a matter of co-operation, of unity, both of which could and would, without doubt, bring along those days on earth when wars would be no more, and as some ancient writer said: "If all mankind could be combined, and own each man a brother? what happiness we would possess in helping one another."

Analysis of Canadian Sanitary By-laws

Being a Proposed By-law to Regulate Sanitary Engineering Construction in the City of Ottawa—The Sanitary Engineer Takes Full Responsibility for All or Part of Any Criticism Made on this By-law.

Article 3.

In the last article, which appeared in the April 15th issue we concluded by commenting upon section 34, we will therefore continue by taking up section 35.

> Section. 35. All plumbing fixtures placed in any building shall be properly trapped, vented and connected to the sewerage drain, soil or waste pipe.

With section 35 we hardly agree, though the spirit of the by-law is no doubt good practice.

It is a well-known fact that a pair of laundry tubs which are placed in a basement would be termed a fixture under this section.

Now, a pair of laundry tubs placed in a basement are very seldom used oftener than once a week. Suppose washing is done on a Monday. It will be Monday again before this fixture is used, and nine times out of ten the trap seal will be broken because of the evaporation of the water which forms the seal.

Another thing, all basements are furnished with a floor drain trap 4-inch cast iron, where iron pipe is required, these traps too, very often become unsealed on account of there being no provisions made to refill the traps with water. If the plumbing by-law were amended in such a way as to demand that the floor of the basement be laid so as to have a fall in one direction, and a floor drain trap placed, say 3 or 4 feet from the wall or location of the laundry tubs, and if the laundry tubs were allowed to waste into a small open catch basin which in turn were furnished with a gutter to convey the waste from the laundry tubs to the floor drain trap, these traps would be oftener sealed than not.

Another thing, 90 per cent. of the houses which are not equipped with laundry tubs at present because of the cost of installation, would be furnished with same [illegible]

The Sanitary Engineer, therefore maintains that by excepting such fixtures as laundry tubs when placed in basement, section 35 could be materially improved, and the floor drain trap would be oftener sealed than not.

Section 36. All sink waste in buildings containing two tenements or more shall enter the stack with a separate full "Y" and 1-8th bend and shall be supplied with a clean-out on [illegible] below the floor, above which [illegible]

Section 37. All refrigerator waste pipes shall be made of galvanized iron pipe and shall be supplied with galvanized iron recessed fittings, and shall be run to an open sink or catch basin, properly trapped and vented.

Section 38. In apartment buildings and in buildings the different flats or storeys of which are separately leased or occupied for human habitation, the refrigerator waste line shall be run through the roof as a vent and it shall be increased to four inches in diameter below the roof line.

Section 39. The size of the pipe used for refrigerator waste lines in buildings leased or occupied as flats or as apartments shall conform to the following table:—

Where not less than 1 or more than 3 refrigerators are attached, the pipe shall be 1¼ inches in diameter.

Where not less than 4 or more than 5 refrigerators are attached the pipe shall be 1½ inches in diameter.

Where more than 6 refrigerators are attached the pipe shall be not less than 2 inches in diameter.

Section 40. Drinking fountains are included under the term "plumbing fixture" and shall in every case have a trap properly vented.

Section 41. No safe waste, range boiler, heating boiler or cistern overflow shall be connected directly with any drain or with a closet tank, but they shall discharge into an open sink or into a catch-basin properly trapped and vented.

On sections 36, 37, 38, 39 and 41, we do not see any need to comment. They are good practical sections and should be embodied in all similar by-laws.

But with section 40 there is some room for improvement. Such a section would be O.K. if all drinking fountains were connected to a drain or sewer, and also if all such fountains only operated intermittently. But there are thousands of drinking fountains which are running continuously and a vent would be superfluous in such a case.

Further, unless the Ottawa Board of Health demand that all drinking fountains shall be constructed so as to waste into a drain or sewer, they could be allowed in many cases to waste into a rain water leader, when such rain water leaders were not used as soil pipes, and in such cases, too, no vent would be necessary.

Of course if all drinking fountains or any drinking fountains be connected direct with any drain or soil and waste pipe, such fountains should be effectively trapped and vented, thus complying with section 40.

> Section 42. All soil pipes within the walls of any building shall be constructed of cast iron, or wrought iron pipe galvanized and shall be continued at least three feet above any opening in the roof which is within ten feet of such pipe and at least three feet above any opening into any adjoining or neighboring building that is situate within ten feet of such pipe, and such soil pipe shall be left open so that the whole of the inside drainage may be thoroughly and constantly ventilated. Every soil and vent pipe must be properly flashed at the place where it passes through the roof with five-pound sheet lead, or 16 oz. copper and made watertight. The use of galvanized iron flanges for such purpose is prohibited.

Section 42 might also be somewhat improved. Many cases arise when by moving the intended location of a soil pipe, such pipe could be run through the roof of the higher portion of a building, thus eliminating the need for a soil pipe terminal projecting through the roof of a lower portion of a building and in such cases the need of a long terminal.

The Sanitary Engineer also maintains that all terminals should be as short as possible and should be increased two inches in diameter. If a soil pipe be 4 inches, it should be increased to 6 inches at the roof. This would be in accordance with the recommendations made by the Canadian Institute of Sanitary Engineers, Winnipeg. See Fig. 1.

With regard to the prohibition of galvanized roof flashing we thoroughly endorse this portion of the by-law.

No practical man would use a galvanized iron flange and roof flashing and the wonder is that so many are specified.

Nothing is more suitable or serviceable than either copper or lead, 16 oz. copper when copper is used will no doubt prove satisfactory. We would, however, have liked to have seen a heavier grade of sheet lead, for the simple reason that many times a flange may be beaten out rather thin when the pitch of a roof is

rather acute the use of 5 lb. lead is quite satisfactory if conditions do not require the flashing to be over-stretched.

Section 43. No soil pipe of four inches in diameter shall receive or have connected to it the discharge of more than four stories of any building let or occupied as apartments or flats; provided further that each storey shall not when connected with soil pipe of stated diameter contain more than two water closets, four baths, four basins, four sinks and two sets of laundry tubs. Where the number of conveniences connected exceed the number stated, the size of the soil pipe shall be increased proportionately. The main vent pipe in all such cases must be increased one size below the roof, and shall pass out separately through the roof.

Section 44. All fittings placed upon soil or waste pipes of wrought iron shall be made from extra heavy galvanized cast iron or malleable iron, recessed and threaded. The burr formed by cutting the wrought iron pipe shall be carefully reamed out, and pipes left full bore.

Section 45. All vertical lines of soil, waste or other pipe inside of buildings shall be supported by wrought iron floor rests of sufficient strength at every second floor, or by a soil pipe hook under each five foot length of soil pipe.

Section 46. No double hubs, straight crosses, double or T. Y.s shall be used in any soil or waste pipe below any fixture. No branch fitting other than a full "Y," or "Y" and ⅛ bend shall be used on any soil or waste pipe running in a horizontal direction.

Section 47. No waste pipes of any description shall be allowed to connect with any closet bend or any lead closet connection. No connection shall be taken off the lead closet connection except the back air vent, and no closet connection or soil pipe to receive closets shall be less than 4 inches in diameter.

On sections 43, 44, 45 and 46 no comment is necessary, but with section 47 a great improvement could be made.

The first part which demands that no waste pipes shall be connected into the lead bend is a step in the right direction. The writer advocated this step a number of years ago, and it is with no small degree of satisfaction that we find most cities are making this change from the old-time method of using the lead w.c. bend as waste pipe for all and sundry fixtures to waste thereinto.

With the word "except the back air vent," we do not agree. In fact there is no practical need for a back vent on a w.c. which is the highest fixture, when the other smaller fixture traps are back-vented.

Say for instance that a house has only one bathroom and w.c. situated on the bedroom floor, and there are no other fixtures situated above that to discharge their waste into the same soil pipe stack, and the bath and lavatory is vented, a back vent on the w.c. bend is superfluous.

Many Canadian as well as American cities are dispensing with this w.c. back vent under the conditions mentioned.

Section 48. There shall be placed in the basement of each tenement or building a deep seal trap having a water seal of 2½ inches or more in depth and of 4 inches or upwards in diameter and fitted with clean-out screws and heavy cast iron strainers to secure surface water, and such trap shall connect to horizontal run with a ⅛ bend.

We do not see any reason for this floor drain trap to be fitted with both "clean-out screws and heavy cast iron strainer." Unless the trap shall be a double hand hole trap, then of course one hand hole would be used for the cleanout screw and the other for the strainer, though two hand holes seem superfluous in our opinion.

Section 49. No double "Y's" will be allowed on the horizontal runs, but each change in direction shall be made with a separate "Y" fitting and with a clean-out screw. If the change of direction is under five feet, 45 degree elbows may be used.

Section 50. No waste pipe from any plumbing fixture shall be of less diameter than the inside diameter of its trap.

Section 51. The inside diameter of all traps for designated fixtures shall be of not less than that specified in the following:—

Traps for water closets, 4 inches inside diameter.

Traps for pedestal slop sink, 3 inches inside diameter.

Traps for combination tub and sink, one 1½ inch pipe to each.

Traps for pedestal urinal, 3 inches inside diameter.

Traps for urinals common, 1½ to 2 inches inside diameter.

Traps for laundry tubs, 2 inches inside diameter.

Traps for vitreous tubs, 1½ inches trap to each tub.

Traps for kitchen sinks, 2 or 1½ inches inside diameter.

Traps for pantry sinks, 1½ inches inside diameter.

Traps for common slop sinks, 2 inches inside diameter.

Traps for wash basins, 1½ inches inside diameter.

Traps for bath tubs, 1½ inches inside diameter.

Traps for shower bath, 2 inches inside diameter.

Traps for sitz bath, 1½ inches inside diameter.

Traps for drinking fountains, 1¼ inches inside diameter.

Traps for dental cuspidor, 1½ inches inside diameter.

No fault can be found with the foregoing sections though section 51 could be improved if a little more rigid.

It is very good practice to designate the diameter size of traps which shall be fitted to the various fixtures, but while the diameter is necessary the depth of seal should also be defined.

For instance, a 2-inch trap may only have a ½ inch seal and still be in accordance with this section under consideration. The opinion of The Sanitary Engineer is that all traps less than 3 inches in diameter should have a depth of seal not less than its diameter, and none less than 1½ inches depth of seal.

The depth of seal is just as necessary as the diameter. The latter is only the capacity of waste flow, but the seal is the "safety first" feature of the trap. We would strongly recommend that the depth of trap seals be embodied in section 51.

Section 52. All drains and all plumbing fixtures shall be provided with sufficient traps and vents to prevent gas from the sewer, drain or waste pipes from escaping into the building, stable or garage drained thereby, and each fixture shall have its own trap with a sufficient vent, such trap to be placed in every case directly under, and as close as possible to the fixture.

Section 53. No fixture shall drain through more than one trap, the main trap only excepted. Every vent shall be not less than one size smaller than trap, and no vent shall be of less than one and one-quarter inches in diameter.

Section 54. No trap vent pipe shall be less than four inches inside diameter where it passes through the roof or outside wall, and all vent pipes must continue to rise after leaving the trap, and pass out through the roof or connect with soil pipe, above the highest fixture. Traps from basins and sinks, when ½ "S" or "P" traps are used, may be vented by a continuous vent if centre of waste opening is not more than 12 inches from face of finished plaster or wall which they pass through or along, measured at right angles from the face of the wall; in all other cases the location of the trap vent shall be governed by Clause 57.

Section 54 can be made more effective by changing the reading "Traps from basins and sinks, when ½ S or P traps are used may be vented by a continuous vent **if centre of waste opening is not more than 12 inches from face of finished**

plaster or wall which they pass through, etc."

Of course when 12 inches is mentioned, it is presumed that the vertical vent and waste pipe is at most 3 inches from centre to face of wall. Making the centre waste from the outlet at fixture to centre of vent and vertical waste about 15 inches centre to centre.

But suppose conditions were to arise where it became necessary to build a wide partition, and the centre to centre measurement were greater than 15 inches, this section would not be practical.

We would, therefore, suggest that instead of mentioning "face of wall," that centre to centre measurements be adopted. The latter would be more practical and specific.

Section 55. No trap vent will be allowed to connect to another vent below a point level with top of fixture for which it is used.

Section 56. A vent taken off a trap or a lead bend under a floor shall be extended in the shortest way to the nearest suitable wall or partition (the distance not to exceed 2 feet 6 inches), and shall then be extended vertically as high as required above the floor lines.

The latter portion of section 56 could be improved somewhat by making it more specific, and instead of using the words "and shall be extended vertically as high as required above the floor line," it should read: "And shall be extended vertically to a point not less than two inches higher than highest water level or point of overflow of fixture to which vent pipe is connected."

We merely suggest such wording as a precaution against persons placing a misconstruction upon or reading meanings into a section which is not intended or is not in the true spirit of the section.

To illustrate our argument in this connection we will cite the following:

In By-law No. 2262, City of Ottawa Plumbing By-law, which is at present in operation, in section 8 the following words appear "The Medical Health Officer or the inspector appointed by the corporation for that purpose **may require either a water or a smoke test**, which tests shall be made by the party whose work is being inspected."

This portion has been amended by a by-law No. 2490. But for years the trade were working under the old wording of the section, and as a matter of fact, the inspector could have allowed work to go by without any test, until the amendment came into force simply because the wording simply said "May require either a water or smoke test. He **may** have required either or neither, though of course the spirit of the section really meant that he would require either one or the other kind of test according to the condition of the weather.

(Continued in next issue.)

Compressed Air Test Advocated

If Uniformity and Progressive Methods are Desirable, the Water Test Must be Dispensed With—Mr. Wynne-Roberts Shows Conclusively the Reason Why Compressed Air Will Prove to be More Efficient.

By R. O. Wynne-Roberts, Consulting Engineer, Toronto.

THE standard test for water-tightness and gas-tightness of drains and soil pipes is the application of water pressure; some test is permitted by some authorities under certain condition. Although the same results are aimed at by the two methods, it is palpable that there are great differences; for example the water test pressure of a vertical soil pipe 50 feet high will range from 21¾ lbs. at the base to nothing at the top, which must inevitably be an erratic test, whilst with the ordinary air and smoke test the pressure may be from ½ oz. to 1 lb., which is quite satisfactory for testing the trap seal and w.c. bowls, but is insufficient to reveal the defects in vent, soil, or drain pipes in a positive manner. The want of uniformity in pressure on the one hand and the inadequacy of pressure on the other when testing the pipes mentioned are matters deserving the serious attention of [illegible]

[illegible] jected to a pressure of ten pounds, for if any part should be choked then the sewage will overflow at the next higher point of inlet or fixture which will generally be less than 23 feet above. Why then test a soil pipe as if it had no intermediate openings?

Editor's Note

The Sanitary Engineer advocated the adoption of the compressed air test for soil, vent, waste and drain pipes. The advent of the high building as well as our climatic conditions makes this method more desirable. Uniformity of test is warranted by the adoption of compressed air. We would like our readers to open up a discussion on this most interesting question.

Soil pipes in Canada have to be protected against freezing and consequently they are always placed inside the building. It is essential that they should be tested for defects lest gases may, in future, emanate therefrom. Blockages can be detected by observing a change in the manner in which sewage is discharged, but sewer gas may not be suspected until some one is stricken with sickness. Soil pipes and drains, however, are ventilated and unless the roof outlet or breathers are blocked no gases can be retained, but, for the sake of safety, it is well to test the pipes. The test to be of real value should be uniformly applied. If gases do by any means get locked then the pressure will be greater at the top than at the bottom, if the pipes are blocked then the water pressure is greater at the bottom than at the top. As the principal danger is the escape of gas then it seems reasonable to protect ourselves against it. It is the invisible and insidious foe.

The water test was originated when sanitary science was practically in its formative stage, that is, when sanitarians early appreciated the need for good plumbing, and to assure good work being executed they applied a rigorous test, but it is, nevertheless, doubtful if they applied it under similar conditions as is done at present.

Moreover the water test is an undesirable one to make in wet trenches, wet weather or during low temperature. Imagine a new building which is almost impossible to warm when the temperature is at zero and a wind blowing, water would congeal and the joints would by nature be made tight under such conditions, and the test would perhaps be valueless.

The smoke or smell test with the low air pressure ordinarily applied is not sufficiently rigorous to reveal defects, but the air will not freeze in the pipes or in the trenches nor create a disagreeable mess. The hissing noise is too faint to be easily located, and the smoke is often too indistinct to be observed.

The writer considers it necessary to apply a compressed air test of about ten pounds pressure. This is not a serious task, as the following calculation will prove. Suppose a soil pipe is 4 inches in diameter and 50 feet high. Its capacity at atmospheric pressure will be

$$\frac{4 \times 4 \times .7854 \times 12}{1728} \times 50 = 4.36 \text{ cubic}$$

feet free air.

(The reader can work out the problem by the circular inch method described in the issue of November 1, 1915, thus $4 \times 4 \times 12 \times 50 \times .000454 = 4.3584$.)

To produce a pressure of 10 lbs. per square inch it will be necessary to pump in more air and the capacity at that pressure will be $4.36 \times \frac{10+15}{15} = 7.27$ cubic feet free air. The additional quantity of air required will then be 7.27 less 4.36 or 2.91 cubic feet, or about 5,000 cubic inches. There will be some slip and leakage in the pump so allow say, 6,000 cubic inches. Suppose we want to produce the required pressure in ten minutes — assuming everything is airtight—then it will be necessary to pump 600 cubic inches of air per minute. Let the little pump have a 4-inch stroke, be double acting and be worked 30 return strokes per minute then the diameter will be $\sqrt{\frac{600}{4x2x30}} = 1.58$.

that is a little over 1½ inches, make it 2 inches diameter which will be a small pump to carry about. Suppose a 6-inch drain 100 feet long is to be tested then the quantity of air to be pumped in, will be about 27,650 cubic inches and to produce 10 lbs. pressure in ten minutes will require a 3-inch pipe, 5-inch stroke, double acting, 30-stroke per minute.

It is easy to design a pump that can be carried about and applied in a simple workmanlike manner. It would also be an easy matter to introduce smoke by means of a smoke rocket, tobacco waste, prepared paper, cotton waste soaked with certain chemicals, or by mixing fumes of acid and ammonia. The air pumped in could be made to pass through the smoke or fumes and by connecting a small flexible hose from the further end of the soil or drain to the pump the mixture would be made to circulate. The advantage of such a test would be absolute uniformity of pressure, leaks would be located by the loud hissing and the discharge of smoke and smell, the test could be made at all times and under practically all conditions and it would conform to the ordinary usages of the soil pipe and drains, the apparatus would be portable, there would be no mess and there would be no excuse for inefficiency. The period of testing is entirely a matter of personal judgment, for if the pressure were maintained on the gauge for about ten minutes it would be evident that the pipes were tight and further testing would reveal nothing more. If, however, leaks were found then, of course, the test would be continued until the defect had been remedied and the pressure was maintained for a specified time. It may be asserted that earthenware, stoneware and concrete pipes are not gas-tight owing to the nature of the materials of which they are made, but if no local leaks were detected, they may be accepted as satisfactory. For even with the water test, sweating on the surface would not be sufficient to condemn the pipes.

New Canadian Patents

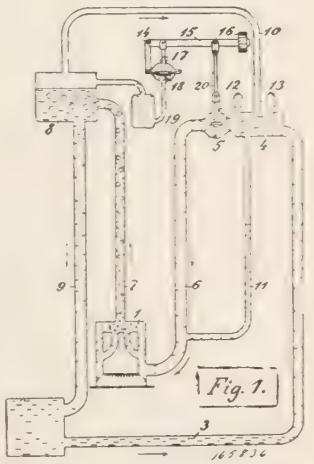
No. 165,836.

Anders Borch Reck, Hellerup, Denmark, 2nd November, 1915; 6 years. Filed 19th January, 1915. Receipt No. 247,163.

Claim.—1. In hot water heating apparatus of the type in which the circulation of the water is produced by the development of steam in or the mixture of steam with the water in the main rising pipe, a method for regulating the velocity of flow of the water in the main circuit of the circulating system, wherein the pressure or temperature of the steam separated from the water rising through the main rising pipe or the temperature of the water is made use of in such a manner that as the pressure or temperature augments or diminishes the flow of water through the main circuit of the circulating system will also be augmented or diminished.

2. In hot water heating apparatus, the process of regulating the velocity of the water circulating in that kind of hot water heating apparatus whereby the motion of the water is effected by a development of steam in the main rising pipe whereby the pressure or temperature of the said steam or the temperature of the water at that point of the system where the steam is separated from the water is made use of for controlling instruments in the main circuit of the circulation system that regulate the quantity of water flowing into the main rising pipe and thereby the intensity of the development of steam in the said pipe, substantially as described.

3. In hot water heating apparatus, the process of regulating the velocity of the water circulating in that kind of hot water heating apparatus whereby the motion of the water is effected by a development of steam in the main rising pipe whereby the pressure of the separated steam exerted upon a diaphragm is utilized to operate means attached to a valve in the main circuit of the circulating system, said means regulating the opening of the said valve, substantially as described.



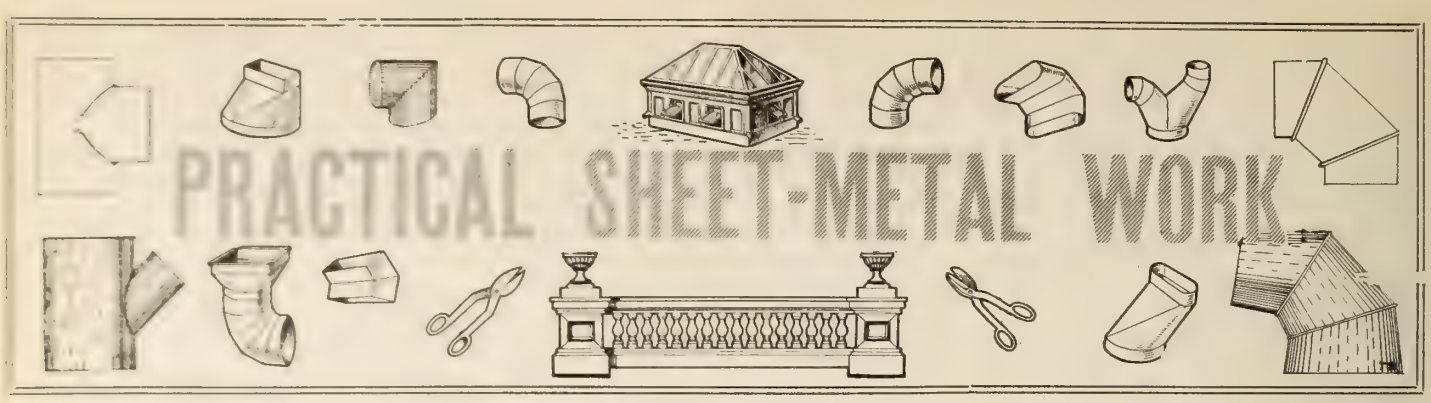
165,836. Hot Water Heater.

No. 165,797.

Emil S. Eyer, Spokane, Washington, U.S.A., 2nd November, 1915; 6 years. Filed 3rd July, 1914. Receipt No. 240,782.

Claim.—In a draft regulator for boiler furnaces, a cylinder communicating with the steam space of the boiler, a piston movable in said cylinder responsive to boiler pressure, a pivoted lever having an operating and connected with said piston and provided with a cable end on that side opposite its pivot with respect to the operating end, check and draft doors for the furnace arranged to close by gravity, cables connected with said doors and also with the cable end of said lever to pull thereon in opposite directions, a weight on the cable end of said lever for initially holding the parts in balanced relation, and weights for the piston resisting movement thereby responsive to boiler pressure, substantially as described.

(Continued on page 30)



By CHARLES SEIVERS

IN drawing out patterns for irregular forms—that is, for articles of different sizes and shapes at top and bottom, such as square or oblong base and round or oval top or oval base and round tops, also when the base and top are not on the same plane, etc., in any of these or other cases, the method used to develop the pattern is called triangulation, and requires a careful study to understand thoroughly. It consists of laying out the article in a series of triangles, the plan forming the base of the triangle, the straight height at the different points forming the altitude, and the hypotenuse or diagonal formed by the base and altitude thus procured is the measurement required to lay out on pattern.

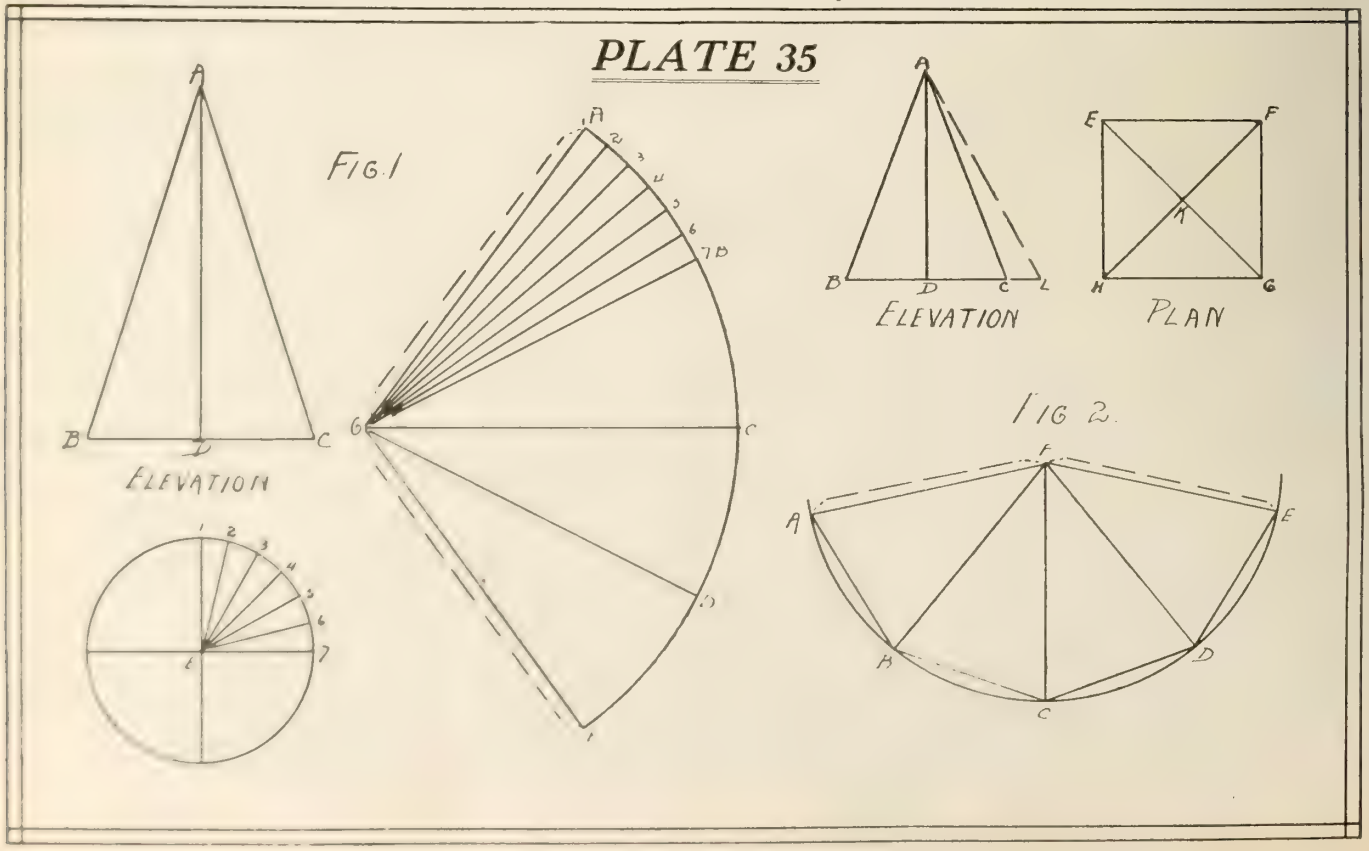
In this article are shown two figures, of what can be called triangulation, although never considered as such. In Fig. 1 is a cone, the base B-C and the altitude A-D. In plan this shows as a circle with diameter equal to B-C, centre E. Divide the circle in plan into a number of equal parts, as shown in quarter section, by 1-2-3-4-5-6-7, and from each point draw lines to centre E. These being the radii of the same circle, are equal to one another; and having same altitude, A-D on elevation, their A-C or A-B will be the radius for all the triangles formed by the altitude A-D and radii on plan.

With A-D as a radius, draw an arc, as A-B-C; draw a line from the centre until it intersects circumference of the arc, as G-A. From A, set off on the circumference of arc the divisions on circle in plan, as shown by 1-2-3-4-5-6-7 on quarter section, repeating them to complete circle. When set off, draw line from last point, as E to centre, then the outline A-B-C-D-E-G will form pattern of cone.

It is to be observed that if a number of pieces were cut, as outlined by A-D-C in elevation, and set on plumb with their base over the radii, they could be swung around to any portion of circle; but if they were not a circle, but an ellipe, they would only cover radii with same base, and the position of each radius is determined or fixed from each other by the equal divisions on circumference.

In Fig. 2 is another example. A-B-C shows elevation and E-F-G-H-K the plan of a pyramid. The altitude of pyramid is shown by A-D. Extend the base of triangle A-D-C, and from D set off the distance K-E on plan, as shown by D-L; then draw a line joining A-L. With A-L as a radius, draw an arc, as A-B-C-D-E-F. From the centre F draw a line intersecting the circumference, as F-A, with compasses set at the distance E-F or F-G, or any of the sides of the plan (all being equal). Now set off on circumference of arc, repeating to complete the four sides of figure; draw lines joining these points, and also from each point to the centre F. The outline thus obtained will give pattern. If the article shown in Fig. 2 was an oblong, the method is the same other than in marking off the circumference; the long and short side must be marked off, as they would be shown in plan—that is, alternately.

PLATE 35



GOSSIP OF THE TRADE

NEW MANAGER OF HEATING DEPARTMENT

A new manager of the wholesale plumbing and heating department of the J. H. Ashdown Hardware Co., Winnipeg, has been appointed in the person of James Glenister, who went to Winnipeg from Metals, Edmonton, where he was manager.

Mr. Glenister learned his trade in Toronto with Bennett & Wright, and after his apprenticeship, went to Galt to the firm of Scott & Bennett. During the year and a half in which he remained in Galt, he was appointed a member of the firm by which he was employed. On leaving, he sold out his interest. Mr. Glenister succeeded Walter Fulton, as Western Ontario representative of the Dominion Radiator Co.

JAMES GLENISTER

Recently appointed manager of the wholesale plumbing and heating department of the J. H. Ashdown Hardware Co., Winnipeg

He is well-known in Ontario, where for five years he covered Western Ontario for the Dominion Radiator Company, Toronto. He left the latter company to go West, first accepting the position of manager of the Lethbridge branch of Metals which he held for four years. At the end of that period, Metals having built a new warehouse and office at Edmonton, Mr. Glenister was transferred to that point.

He has not reached his present position without hard work. As a young man he studied hard at nights, and always aimed at reaching something higher in his trade. While in Western Canada he has worked up a good connection, and since his appointment to this important position with the J. H. Ashdown Hardware Company, has received a number of letters of congratulation. Mr. Glenister is well-known as a sportsman, being president of the Alberta Trap Shooting Association. He is also a curler, but shooting is his principal hobby.

NEW ADDITIONS TO PLANT

Two additions 20 ft. x 100 ft. and 40 ft. x 80 ft. are being made to the plant of Dominion Sheet Metal Company, at Hamilton, Ont.

It is an interesting fact that while the sheet galvanizing plants of the United States have operated only on a 30 per cent. basis thus far in 1916, this new plant in Canada has done considerably better.

Immense difficulties have been encountered in freight embargoes, both inbound and outbound, shortage in natural oil as fuel supply, extreme scarcity and high cost of labor, excessive prices of raw materials, all sufficient to discourage even an old-established concern.

The Dominion Sheet Metal Company is sparing no expense to give Canadian buyers of galvanized sheets a steady supply at this time, when import shipments are negligible.

TORONTO SOCIETY NEWS

At the regular monthly meeting of the Toronto Society of Domestic Sanitary and Heating Engineers, 22 College Street, Toronto, to be held May 17th, the delegates to the Ontario Society annual convention as well as the Toronto annual meeting will be elected.

Both these important meetings will take place in London at the same time and place as the convention of the Canadian Society is to be held. Monday and Tuesday of that week are the days set. Full particulars as to rates, etc., will appear in the next issue of The Sanitary Engineer.

Entertainment Committee Baseball Club

The Toronto Society Baseball Club will meet at above rooms on May 18th, when new officers will be appointed and the programme for the season will be drawn up.

Don't Forget the Buffalo Trip

The members are asked to keep the date clear for the Buffalo trip to Edgewater on June 28th. It is not yet decided whether the trip will be by boat or by rail; but if the latter, it is expected to have a number of the Hamilton craft join in the event.

Full particulars will be published in a later issue of The Sanitary Engineer.

New Members

G. R. Baker and W. J. Hall, Toronto, sanitary and heating engineers, were elected members of the Toronto Society recently.

H. Aked, sanitary engineer, 679 Dundas Street, London, was elected a member of the London branch of the Ontario Society of Domestic Sanitary and Heating Engineers.

Mr. Aked is a practical man, and enjoys a splendid reputation for good work in London. He is also a regular reader of The Sanitary Engineer.

GONE PROSPECTING

A. H. Read, sanitary engineer, Toronto, is on a trip to the Gowganda mining fields. Mr. Read is the owner of a number of claims in that region, and, finding business a little on the slack side at this time in Toronto, he has hiked off to the land of precious metals for a while. The worst wish of The Sanitary Engineer is that he will come back loaded up with as much lucre as his heart desireth.

MODERN HEATING

Above is the title of a very nicely illustrated booklet being issued to the trade by the American Pressweld Radiator Corporation, Detroit, Mich., along with an argument entitled Sheet Metal versus Cast Iron.

This literature may be procured free upon application from the above-named corporation.

WITH THE FIGHTING FORCES

The Toronto Society of Domestic Sanitary and Heating Engineers have lost quite a number of their members, who have heard their Country's Call. To date no less than eight members have joined.

The first being Harry Ruddick. Harry is now at the firing line and from letters received by his good lady, we are told he has had some very narrow escapes. Upon one occasion several of his comrades were carried off by a shell, which exploded not more than 8 or 10 feet from where Harry was fighting.

But the boys are all in the best of spirits he says.

Honour Roll

The roll of Honour with the Battalions in which the various members are enlisted and the order in which they joined is as follows:

Harry Ruddick	Eaton Battery
Forbes Keith	81st Battalion
Allan Keith 170th	Battalion
Robt. G. Henderson.	134th Battalion
George Kirtley	220th Battalion
Thomas Ferguson ..	216th Battallion
Albert E. Crowne	Sanitary Corps
Harry Griffith	48th Battalion

At a later date we expect to be able to give a list of such members of the various societies throughout the Dominion.

Anyone being acquainted with men who have joined the fighting forces will be assisting the Editor to no small degree by sending particulars of ftheir names and addresses and the battalion which they have joined.

ANGUS McDONALD

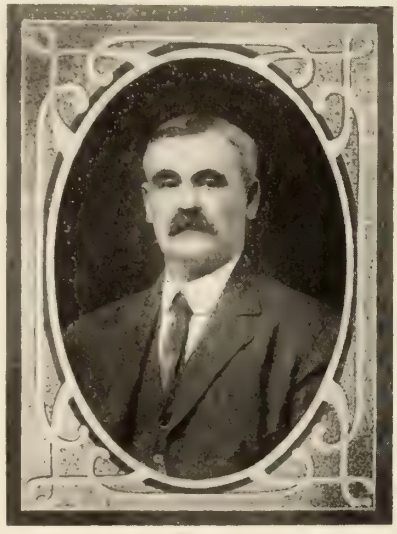
When the craft in Stratford decided to form a branch of the Ontorio Society off Domestic Sanitary and Heating Engineers, some time ago, it meant that to have a practical and united membership as many as possible would have to do their bit in actual service.

Amongst those chosen to hold office, none is more active than is Bro. Angus McDonald. He was appointed chairman of the sanitary committee to the Canadian Society of Domestic Sanitary and Heating Engineers, last June the members of the Committee elected were as follows: Angus McDonald, chairman, F. L. Duggan, F. J. Sylvester, H. J. Peters, of the firm of Peters & Sylvester, and J. J. Robb of The Classic Sanitary and Heating Co., all of Stratford.

It may not be out of order to give a short history of the worthy chairman of the committee.

Beginning his apprenticeship in the year 1877 with the late P. & J. Birch of Stratford, and remaining with them some three and a half after, finishing his apprenticeship term with A. C. Coulto, now of Cleveland, Ohio, and with a view of gaining a wide and practical experience Angus labored in a number of towns and cities both in Ontario and in New York State. With this experience he was well fitted for another venture, when he launched into business on his own account, 21 years ago in the little town of Mitchel, Ontario, not far from Stratford, later on taking a partner by the name of T. E. Henry, with whom he is still working. Ten years ago his Company acquired the business of F. Smith of Stratford.

It will therefore be seen that Mr. McDonald has been actively engaged in



ANGUS McDONALD

Stratford, Chairman of Sanitary Committee, Canadian Society of Domestic Sanitary and Heating Engineers

the sanitary and heating business for over 38 years, which experience no doubt fits him well for the position of chairman of the Sanitary Committee of the Canadian Society of Domestic Sanitary and Heating Engineers.

CHANGE OF ADDRESS

L. O'Neil, sanitary, heating and lighting engineer, whose establishment for some years was situated on College St., Toronto, has moved his place of business to 416 Roncesvalles Ave., Toronto. He is a firm believer in displaying his goods in an attractive manner which no doubt cannot fail to pull business. The Sanitary Engineer hopes the move will prove to be one in the right direction.

NEW SHOW ROOM

The Vici Radiator Co., Hamilton, has moved to a more central location, while their factory is still situated at the old address, the office and show room is now situated at No. 6 John St., North near King.

Genial D. M. Speirs, the manager is always pleased to meet members of the craft, when on a visit to Hamilton.

SANITARY ENGINEER DOING WONDERFUL WORK

The Sanitary Engineer, Toronto,

Enclosed please find my cheque for $1.00 for subscription to The Sanitary Engineer as per invoice enclosed. Might say that I am always pleased to see this magazine come into the office.

I can assure you it is doing wonderful work for the trade and is highly appreciated by all the members of the craft.

Wishing you every success, I am,

Yours very truly,

R. J. Shannon.

Cor. Queen and Gwynne Ave., Toronto.

WITH THE SUPPLY MEN AND MANUFACTURERS

New Branch Established

The Empire Manufacturing Co., London, have made another important as well as progressive move in establishing a branch in Toronto.

This concern have acquired the business of the National Plumbing Supply Co., Adelaide Street W., Toronto, which will be known from now on as the Toronto branch of the Empire Mfg. Co.

Appointed Manager

The manager to take charge of this important branch is our well-known and congenial friend, W. G. Foster, late of the Canadian Wolverine Co., Chatham. Mr. Foster has had a wide experience in the plumbing supply business, which no doubt will make the new establishment do justice to the trade in this territory by rendering an excellent service to all with whom he comes in contact.

Conway Goes West

J. Conway, who for some time represented W. A. Porter & Co., plumbers' supplies, Toronto, has been appointed to represent the H. Mueller Mfg. Co. on their Western territory, and left recently to take up his new duties. It is to be hoped Jack will meet with the success which he deserves.

Another New Man for Mueller's

Fred Heximer, of Niagara Falls, Ont., and a one-time member of the Ontario Society of Domestic Sanitary Engineers, has been allotted Western Ontario in which to labor in the interest of the Mueller people.

London Engine Supply Co.

This concern has appointed the genial Charles Childs to represent them on the road.

Charley is well known in Toronto and vicinity, and has for some time past represented the Glauber Brass Mfg. Co. of Cleveland. He carries the good wishes of all his friends in the Toronto district.

Joins Big Club

Time and again rumors have floated round that Bro. Sam Ryding had succumbed to the fiery darts of Dan Cupid. But the rumors have been false alarms. At last, however, Dan got his innings, and the worthy Samuel had at last to take notice. It was simply out of the question that a personage so universally liked as Ald. Sam Ryding should be allowed his freedom any longer, and no doubt, now that he has joined that club of all clubs, the matrimonial club, he will feel more settled again. This is, we might say, Bro. Ryding's second venture, though his term of single blessedness was so long that many thought, in spite of the rumors, that he would finally evade a second attack by wary Dan Cupid after all.

In addition to being one of Toronto's aldermen, Mr. Ryding also represents the Dominion Radiator Company, Toronto, and is highly respected by all with whom he has to deal.

The Sanitary Engineer joins in wishing friend Ryding much joy as a member of the biggest, best and most popular club on earth.

PRICE CHANGES

The man who is fortunate enough to have a good stock of material on hand, bought some time ago, will no doubt be interested to know what changes have taken place in price.

For instance malleable iron fittings are 40 per cent. higher than a year ago. There having been no less than nine changes in that period, five of these changes having taken place since last January.

Brass goods have changed in price 3 times since January, enamelware 3 times, closet tank combinations 3 times, and wrought iron pipe has changed in price 5 times.

It will therefore be seen that with the metal market in general being in such an unsettled state, those tendering on work should make sure of their prices before submitting tenders of any large amount.

Brass has played a very important part in this present conflict, and will do until its close, so will iron and steel. Therefore as we before stated, prices of these lines should be watched very closely, or big losses may result. We compare below the prices of a few lines as given out on March 10th and May 1st.

	Mar. 10.	May 1.
Baths.		
4 ft., 4½ ft. or 5 ft.	$18.00	$18.90
5½ ft.	20.40	21.30
Lavatories.		
18 x 21, roll rim	5.87	6.30
17 x 19, apron	5.77	6.25
18 x 21, apron	6.82	7.25
18 x 24	8.98	9.65
Roll Rim Sinks.		
18 x 30	9.28	10.00
20 x 30	9.88	10.60
Flat Rim Sinks.		
16 x 24	3.40	3.65
18 x 30	3.70	4.00
Range Boilers.		
30 gal., galv.	7.25	8.25

and these prices will probably have taken still another jump by the time we go to press.

PUBLIC TOILETS MEAN PUBLIC HEALTH

No city or village should longer delay the establishment of ample public comfort stations. Public officials are derelict in their duty if they fail to meet this problem—this crying need, even in the absence of favorable public opinion. Public officials, particularly health authorities, are supposed to know the real necessity of such institutions, and, regardless of lack of public demand, should take the initiative and help in the conservation and preservation of the communal health.

Every city has some suitable site for a comfort station, or can readily acquire one, and the size and cost can be easily adjusted to the community exchequer and the demand due to population, permanent and floating. Will you not discuss this matter with the proper officials or organizations in your community in order that a definite start may be made in advancing the health, morals and comfort of your fellow-citizens?

In European Countries

In England, Germany, France, and Belgium, public comfort stations are not of recent origin. These countries, and others as well, have long since recognized the need of such establishments for the health and convenience of the public.

BE A MAN

It's a mighty good thing, while you're running life's race,
Just to pause as you go, and to come face to face
With your conscience, and ask it a question or two:
For it's right you should know what your life means to you.

Have you done things worth while, have you drifted along?
Have you filled it with sighs, have you filled it with song?
Have you helped when you should, have you tried to do right?
Have you struggled for good, or just fought on for might?

Have you given your hand to some fellow in need?
Have you sneered at the man who was not of your creed?
Have you been open-hearted and ready to do?
Have you tried to be just, have you tried to be true?

In your judgment of men, have you been always fair?
Have you learned to forgive in the face of despair?
Have you fought against greed, or succumbed to its lust?
Have you learned what it means to protect and to trust?

Oh, it's easy to preach and it's easy to tell
Of the other chap's faults, but your own faults—ah, well:
We are cowards at times, and the truth you will find
Is a thing we dislike, for it's rather unkind.

But the past, let it rest: give a thought to to-day,
And to-morrow as well, for the time's growing grey:
Do the things that you should, do the best that you can,
Crown your life with your deeds, be a red-blooded man.

W. DAYTON WEGEFARTH.

"Thou Shalt Not" Steal Time

Time is Everybody's Wealth—It Can Only be Used in Two Ways —To One's Credit or Discredit—Our Time Belongs to Someone Else and His Time Belongs to Us—Then Don't Steal His Time and Don't Let Him Steal Yours.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

WILL SEPTIC TANK FREEZE?

Editor The Sanitary Engineer. In issue of March 15, you show in the Question Box the design of a septic tank. Must we have a vent pipe on the outlet of the system? And if so would a 4 in. pipe do instead of 3 in.?

Will a septic tank like that freeze in winter time at 60 below zero, and what precaution would be needed to prevent it?

P. A. M., Fort S.

There should always be a vent pipe placed as shown, but in very cold climates it may be well to cover the vent in winter with a quantity of straw manure not packed down.

A 4-inch pipe would do if the branch of the tee is reduced to 2 inches.

As regards the septic tank freezing, this would not freeze once the bacteria has been thoroughly cultivated, that is providing the tank has been in use all summer, or six months.

It is the live bacteria when properly cultivated, that keep the contents of the tank warm.

But suppose a tank has only been in use a week or two before the cold weather sets in, it would be well to have a good layer of manure placed next to the tank cover, then earth on top of that and another layer of manure on the surface. The top layer may be removed when the first winter is passed.—Ed.

BEST PAINT FOR RADIATORS

Editor The Sanitary Engineer.

I expect to have a lot of radiation to paint and would like to know which is best.

I have been told that white or light-colored paints will fade, and also that aluminum paint is not good. Please give me any information you can in the matter.

G. D. B.

The writer has received little practical information that could be used in answering this question, as heating for radiators, either steam or hot water. It is necessary, however, to first give the radiators a priming coat of white lead paint when new radiators are being painted with bronze.

As regards white paint fading, this is so, though white lead will stand longer than adulterated.

The following table showing results of tests will no doubt be of value to our inquirer as well as other readers of The Sanitary Engineer. It is reprinted from Prof. Rolla C. Carpenter's book entitled, "Heating and Ventilating Buildings." Profesor Carpenter is one of our greatest authorities on matters of heating:

Percentage of heat transmitted by various pipe coverings from tests made at Sibley College, Cornell University and at Michigan University.

KIND OF COVERING (Relative amount of heat transmitted)	
Naked pipe	100.
Two layers asbestos paper, tin, hair felt and canvas cover	15.2
Two layers asbestos paper, 1 inch hair felt, canvas cover, wrapped with manilla paper	15.
Two layer asbestos paper, 1 inch hair felt	17.
Hair felt sectional covering asbestos lined	18.6
One thickness asbestos board	59.4
Four thickness asbestos paper	50.3
Two layer asbestos paper	77.7
Wool felt, asbestos lined	23.1
Wool felt with air space, asbestos lined	79.7
Wool felt plaster, paris, lined	25.9
Asbestos moulded, mixed with plaster paris	31.8
Asbestos felted, pure long fibre	20.1
Asbestos and sponge	18.8
Asbestos and wool felt	20.8
Magnesia, molded, applied in plastic form	22.4
Magnesia, sectional	18.8
Mineral wool, sectional	19.6
Rock wool fibrous	20.3
Fossil meal, molded, ¾ inch thick	29.7
PIPE PAINTED WITH BLACK ASPHALTUM	105.5
PIPE PAINTED WITH LIGHT DRAB LEAD PAINT	108.7
Glossy white paint	95.0

It will be noted by the table that pipes painted with black asphaltum and pipes painted with light drab lead paint actually increased the efficiency of the heating surface, while glossy white paint resulted in a loss of 5 per cent., or more than 10 per cent. difference between that and the asphaltum.

While this table refers to the heat loss, or increase, resulting from any known kind of covering, whether the coating or covering be paint, cotton asbestos, or anything else.—Editor.

THE NEED OF PUBLIC COMFORTS

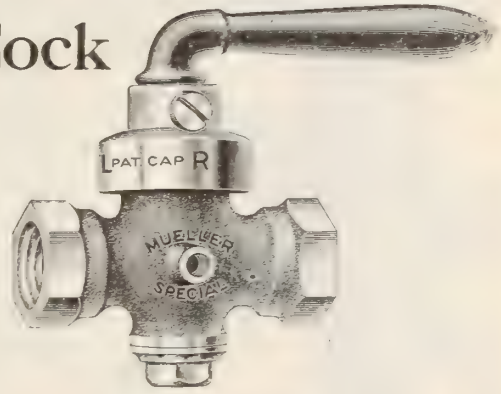
The need of such public conveniences, which should be open day and night throughout the entire year, for all classes, is too apparent for extended comment. Women shoppers and visitors frequently accompanied by little children, transient travellers without hotel accommodation, working men and women, postmen, policemen, street employees, newsboys, messengers and many others whose daily duties necessitate their being on the streets most of the working day—to say nothing of the school children, the aged, and the unemployed seeking work.

Mueller
Tested 200 lbs. Hydraulic Pressure
And Unconditionally Guaranteed
Plumbing Brass Goods

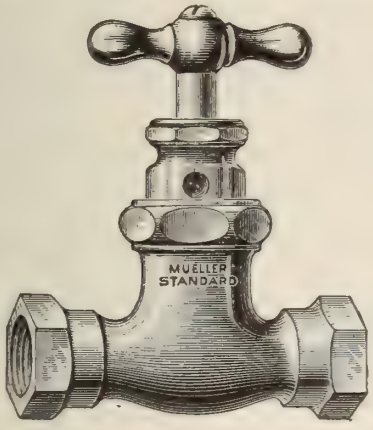
Mueller Stop and Waste Cock

Ground Key Work

Made for Iron, or Lead Pipe as well as Lead and Iron. Heavy Pattern with free, clear water ways. Smooth working.



Mueller Compression Stop Waste Cock



Made of high copper bearing Bronze—nothing but virgin metal used.

Encased seated washers of the highest grade.

Perfectly fitted threads throughout.

All parts interchangeable.

Pressure is not open to waste when being turned on or off.

It is greatly to your interest to use only the very best in stop and waste cocks.

Poor stop and waste cocks have cost more to the consumer as well as the trade than any other piece of brass goods used in the sanitary and heating business.

A stop and waste cock that fails to act in case of emergency may cause serious damage to your customer's home and your reputation.

Mueller Stop and Waste Cocks are positively reliable. Whether they are operated often or once in months or years, they are ready to act efficiently.

Once operated may be worth several times the first cost.

Nearly 60 years' experience, supreme efforts to produce only the best in brass goods and our unconditional guarantee stands behind these and all other Mueller lines.

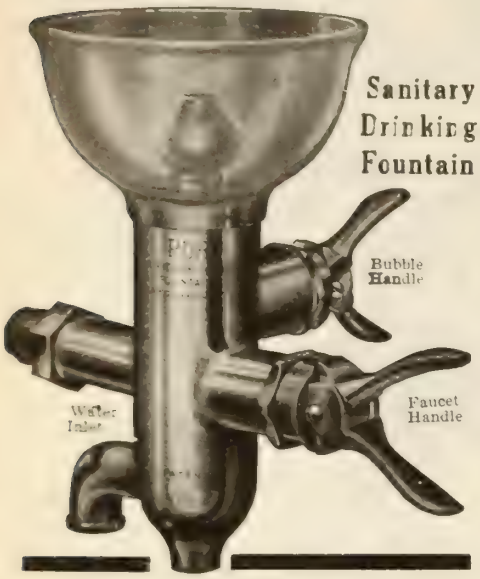
Write for complete catalog.

H. Mueller Mfg. Company, Limited

SARNIA, ONTARIO

Makers of High-grade Water, Plumbing and Gas Brass Goods.

PURO
(MADE IN CANADA)



Good-bye
GERM-LADEN DRINKING CUP

The old-fashioned public drinking cup, with its disease-carrying possibilities, is rapidly disappearing as a result of the movement advocating "Safety First" where drinking water is concerned.

There consequently is creating a big demand for some simple sanitary device to replace the discarded cup in thousands of factories, offices, public parks, schools, etc.

There is an unusual opportunity for the live sanitary engineer to materially increase his turnover by getting after the school boards, offices, factories, etc., in his neighborhood.

Bring you profits at the

Puro Sanitary Drinking Fountain

Whose prospects will readily appreciate its many attractive features, particularly its simple, automatic control. Does the work and lay up the profits within your easy reach.

Puro Sanitary Drinking Fountain Company
147 University Ave., Toronto, Canada

When writing to advertisers kindly mention this paper

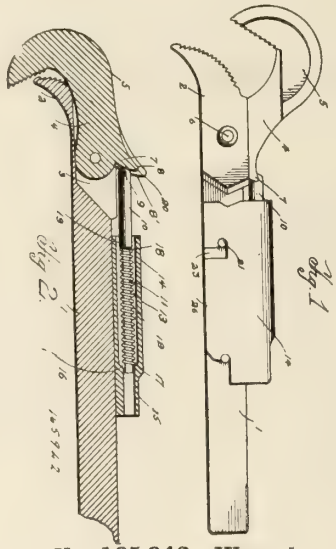
New Patents

No. 165,942.

Thomas Holmes, Medford, L.I., New York, U.S.A., 9th November, 1915; 6 years. Filed 15th June, 1914. Receipt No. 240,104.

Claim.—1. In combination with a pipe wrench having a fixed and a pivoted jaw and a shank, a separable spring actuated plunger member adapted to actuate said pivoted jaw, a removable housing for said plunger member, a bayonet lock connection between said housing and shank, a heel on said pivoted jaw against which said plunger is pressed to actuate the jaw and hold said housing against accidental removal from said shank.

2. A pipe wrench consisting of a shank having a fixed jaw thereon, a pivoted jaw, a heel on said last jaw, a removable housing on said shank, a spring pressed plunger seated in said



No. 165,942. Wrench.

housing and adapted to engage said heel to hold said pivoted jaw in either an opened or closed position, said housing having opposing depending side wall slots in said walls and pins on said shank, the action of said plunger against said heel adapted to hold said pins and slots interlocked.

3. In combination with a pipe wrench having a shank with an integral jaw and a pivoted jaw, a removable plunger seated outwardly of said shank and adapted to control said last jaw, a spring adapted to actuate said plunger, a housing for said plunger and spring, said housing being removably secured to the outer walls of said shank, slots in said housing and pins on said shank whereby they are connected.

4. In combination with a pipe wrench having a shank with an integral jaw and a pivoted jaw, a removable plunger seated outwardly of said shank and adapted to control said last jaw, a spring adapted to actuate said plunger, a housing for said plunger and spring, said housing being removably secured to the outer walls of said shank, slots in said housing and pins on said shank whereby they are connected, said plunger being adapted to press against said pivoted jaw and thereby hold said housing against accidental removable from said shank.

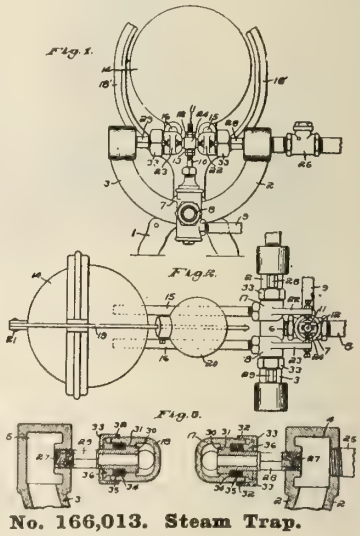
* * *

No. 166,013.

The Nashua Machine Co., assignee of Frank A. Littlefield, both of Nashua, New Hampshire, U.S.A., 16th November, 1915; 6 years. Filed 30th August, 1915. Receipt No. 255,483.

Claim.—1. A steam trap comprising in combination, a yoke having opposed arms, pipes mounted therein and extending toward each other, couplings mounted for oscillation upon said pipes, and means tending to move said couplings toward each other, said couplings and pipes being respectively provided with internal shoulders and circular heads engaging with a sliding fit, packing rings engaging end faces of said shoulders and heads, and means to confine said packing rings in position.

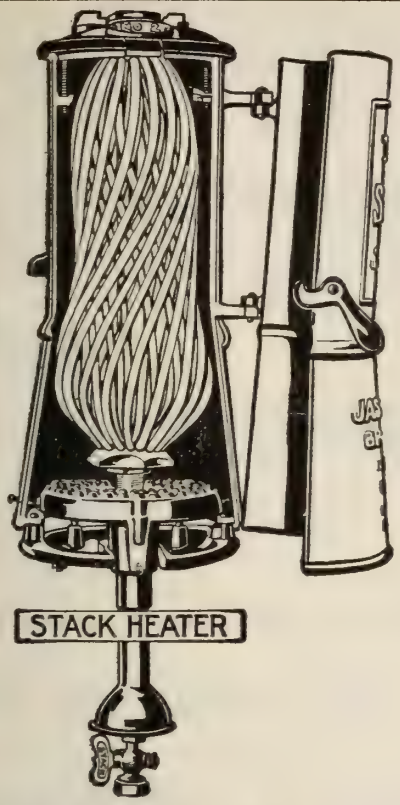
2. A steam trap comprising in combination, a yoke having opposed arms, pipes mounted therein and extending toward each other, means to spring said pipes toward each other, couplings mounted for oscillation upon said pipes, said couplings and pipes being respec-



No. 166,013. Steam Trap.

tively provided with internal shoulders and circular heads engaging with a sliding fit, packing rings engaging end faces of said shoulders and heads, and means to tighten said packing rings against said end faces.

3. A steam trap comprising in combination, supporting means, pipes mounted thereon, couplings mounted for oscillation upon said pipes, said couplings and pipes being provided with internal shoulders and heads engaging with a sliding fit, packing rings engaging end faces of said shoulders and heads, means to confine said packing rings in position.



THE SECRET OF POWER
IN
The Stack Gas Water Heater

Why can the STACK produce a hot water service which is far in advance of any other tank heater? The answer is so simple and apparent as to be easily missed.

Hot water naturally rises immediately upward—not sideways, but up—straight up.

The STACK is built more nearly to allow this direct, straightway, upward movement than any other heater.

Test yourself the truth of this statement.

Write for Booklet.

EASILY SOLD **BIG PROFITS**

James Morrison Brass Mfg. Co., Limited
93-97 Adelaide Street West, TORONTO

Our Mixed Metal Sales Amount to Over $5,000,000 Annually

We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO
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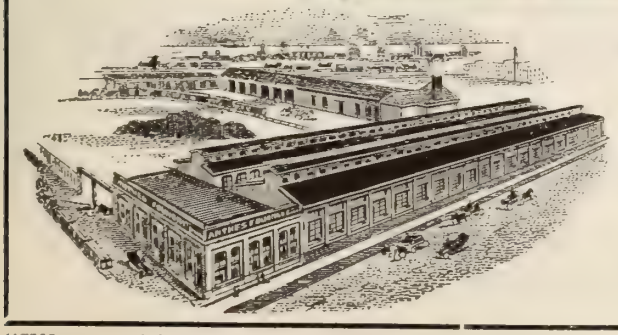
TORONTO **ANTHES FOUNDRY LIMITED** WINNIPEG



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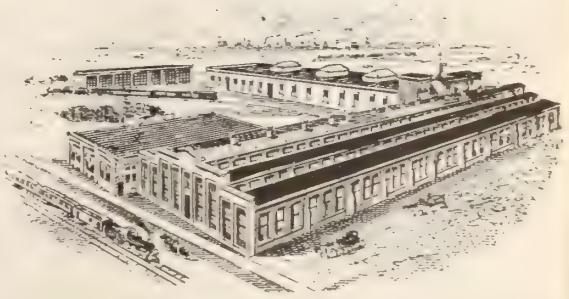
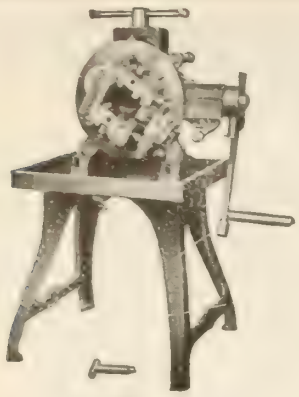
SOIL PIPE
AND
FITTINGS





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PIPE MACHINES

Either Hand or Power

This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
A time and labor saving machine.

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World-Famed Specimens of the Age of Steel

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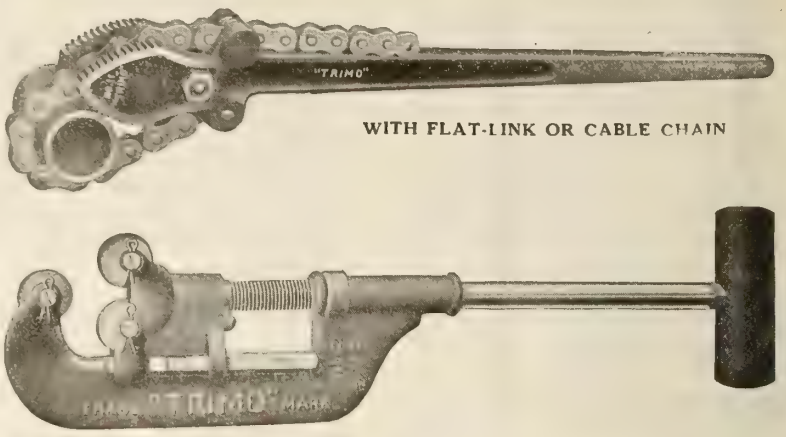

WITH FLAT-LINK OR CABLE CHAIN

TOOLS

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MADE BY

TRIMONT MFG. CO., 55 Amory Street, Roxbury, Mass., U.S.A.

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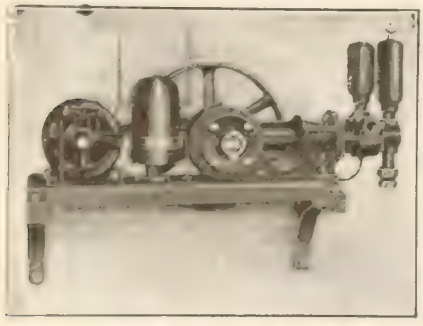
310 Temple Building, Bay Street, Toronto
Water Supply, Sewerage, Sewage Disposal of Cities, Villages and Institutions.

The Paul Electric Motor Pump



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BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

Ask your jobber for Brand

CANADIAN TUBE & IRON CO., LIMITED
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The Honeywell Air-Seal Generator

Generates and maintains a predetermined pressure without the use of springs, valves, weights or mechanical parts.

Made entirely of cast iron and will last indefinitely.

Easy to connect and requires no attention after installing.

Write for complete catalog—it describes in detail the construction and operation of this simple and inexpensive pressure-creating device.

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Wabash, Indiana

Consulting Sanitary Engineer

Advice and Plans on
Water Supply and Sewage Disposal for Residences, Factories, etc.

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BOX 95. SANITARY ENGINEER TORONTO

STOPPING your advertising to save money is like stopping the clock to save time.

Plumbers, Prepare to Keep Busy!

Keep Cool

Keep the Peace

and keep a

Williams' "VULCAN" Chain Pipe Vise
where it will serve you when you require its aid.

J. H. WILLIAMS & CO.
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THE WRENCH PEOPLE

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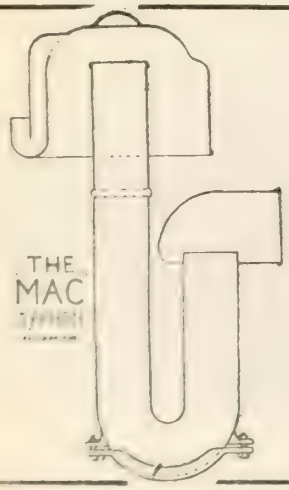

A Syphon that Syphons Every Time

Do you ever count the fitting, note the time and material when you make a syphon up from soil pipe and fittings?

Our price for a real syphon will cut down cost.

We also manufacture a good line of soil pipe and fittings.

West Toronto Foundry Company

Cor. of Mulock and Junction **West Toronto**

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Why not make Dollars Grow out of your *spare* time. Spare-time efforts have made hundreds of dollars for MacLean Representatives. To-day there are in Canada men and women, who find that our proposition worked for an hour or two daily provides for many of the added luxuries of life. You supply the time—we'll supply you the money. Write for full particulars.

The MacLean Publishing Co , Limited
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A condensed ad. in this paper will bring results from all parts of Canada : : : :

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C. A. Dunham Co., Ltd., Toronto.

Air Valves.
Canadian Wolverine Co., Ltd., Chatham.
Beaton & Cadwell Mfg. Co., Ltd., New Britain. Conn., U.S.A.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
Jenkins Bros., Ltd., Montreal.
Kerr Engine Co., Ltd., Walkerville.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Asbestos Goods.
James Morrison Brass Mfg. Co., Toronto.

Boilers, Steam or Hot Water.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Boiler Feed Regulators.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Brass Goods, Valves, etc.
Canadian Wolverine Co., Ltd., Chatham.
C. A. Dunham Co., Ltd., Toronto.
Jenkins Bros., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Brass Pipe and Tube.
Canada Metal Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Bubblers.
Canada Metal Co., Ltd., Toronto.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.

Cellar Drainers.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Chain Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Closets.
Amherst Foundry Co., Amherst, N.S.
B. O. T. Manufacturing Co., Toronto.
Canada Metal Co., Ltd., Toronto.
Cluff Mfg. Co., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Consulting Engineers.
H. L. Seymour.
R. O. Wynne-Roberts, Toronto.

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Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Limited, Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Damper Regulators.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Drainage Fittings.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.
West Toronto Foundry Co., West Toronto.

Drinking Fountains.
Canada Metal Co., Ltd., Toronto.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.

Ejectors, Steam.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville.

Ejectors for Sewage.
Darling Bros., Ltd., Montreal.
National Equipment Co., Ltd., Toronto.

Enamelware.
Amherst Foundry Co., Amherst, N.S.
Canada Metal Co., Ltd., Toronto.
Cluff Bros., Church St., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.
Standard Ideal Mfg. Co., Ltd., Port Hope.

Electric Pumping Machinery.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

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Canada Metal Co., Ltd., Toronto.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.

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Canada Metal Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Flushometers.
Canada Metal Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Floor and Ceiling Plates.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.
Canadian Wolverine Co., Ltd., Chatham.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
James Morrison Brass Mfg. Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

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National Equipment Co., Ltd., Toronto.
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Gas Water Heaters.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

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Hoyt Metal Co., Toronto.
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H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Co., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

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Trimont Mfg. Co., Roxbury, Mass.

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Canadian Tube & Iron Co., Ltd., Montreal.
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Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.
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Canadian Wolverine Co., Ltd., Chatham.

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H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
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Trimont Mfg. Co., Roxbury, Mass.

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Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

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Anthes Foundry Co., Toronto and Winnipeg
Galt Brass Mfg. Co., Galt.
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H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Warden King, Ltd., Montreal.

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Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.
A. B. Jardine & Co., Hespeler.

Pipe Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

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Canada Metal Co., Ltd., Toronto.
Amherst Foundry Co., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Pumps.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Cluff Bros., Church St., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Radiators.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., Ltd., New Britain. Conn., U.S.A.

Radiator Traps (Steam).
W. E. Clark & Co., Ltd., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Reducing Pressure Valves.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Septic Tank Valves and Syphons.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
West Toronto Foundry Co., West Toronto.

Solder.
Canada Metal Co., Ltd., Toronto.
Hoyt Metal Co., Toronto.

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W. E. Clark & Co., Ltd., Toronto.
Darling Bros., Ltd., Montreal.
Dart Union Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville, Ont.

Steam Traps.
Canadian Morehead Co., Ltd., Woodstock.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Smoke Test Machines.
James Morrison Brass Mfg. Co., Toronto.

Tanks, Steel and Wood
Ontario Wind Engine & Pump Co., Toronto.

Testing Plugs.
James Morrison Brass Mfg. Co., Toronto.

Tools.
Armstrong Mfg. Co., Bridgeport, Conn.
Canadian Wolverine Co., Ltd., Chatham.
Hall & Sons, Ltd., Brantford.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Nicholson File Co., Port Hope, Ont.
Williams, J. H., & Co., Brooklyn, N.Y.

Unions.
Dart Union Co., Ltd., Toronto.

Vapor Heating Systems.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
W. E. Clark & Co., Ltd., Toronto.

Vitro Tanks
Cluff Mfg. Co., Toronto.

Vacuum Systems of Heating.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto

Water Supply Systems.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Darling Bros., Ltd., Montreal.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Stephen Leacock

who writes on "Humor as I See It," with some opinions on Canadian humor—or the lack of it.

Agnes C. Laut

discusses what the effect on Canada would be "If Uncle Sam Goes to War."

Arthur E. McFarlane

begins an enthralling mystery story, "Behind the Bolted Door?"—a psycho-analyst's solution of a baffling crime.

Robert W. Service

begins a new series of his virile poems—"My Mate" written somewhere in France.

Nellie McClung

"Speaking of Women" is a finely treated consideration of woman's place and work during these momentous times.

All in the May Number of MacLean's

Also C. C. James, James L. Hughes, N. W. Rowell, J. P. Downey and Sir Herbert Ames contribute signed statements on current Canadian matters, in a new department, "From the National Viewpoint."

The popular Review of Reviews Department, Short and Serial Fiction, Business Articles, and numerous feature specials combine to make the May MACLEAN'S a very appealing issue.

Arthur Stringer's new romance, "The Anatomy of Love," begins in the June issue.

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is an all-Canadian magazine of surpassing interest to every true Canadian. It is its **Canadian** savour that makes MACLEAN'S so esteemed—this and its very high literary merit.

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If you enjoy stories in which apparently baffling mysteries are unravelled, read "Behind the Bolted Door?" If you desire a magazine whose note is Canada First, you will find it in MACLEAN'S. If you are ready to give your practical endorsement of a policy which has for its end the development of a worthy Canadian magazine in which the best work of the best Canadian writers, artists and sentiment shall find expression, then buy MACLEAN'S.

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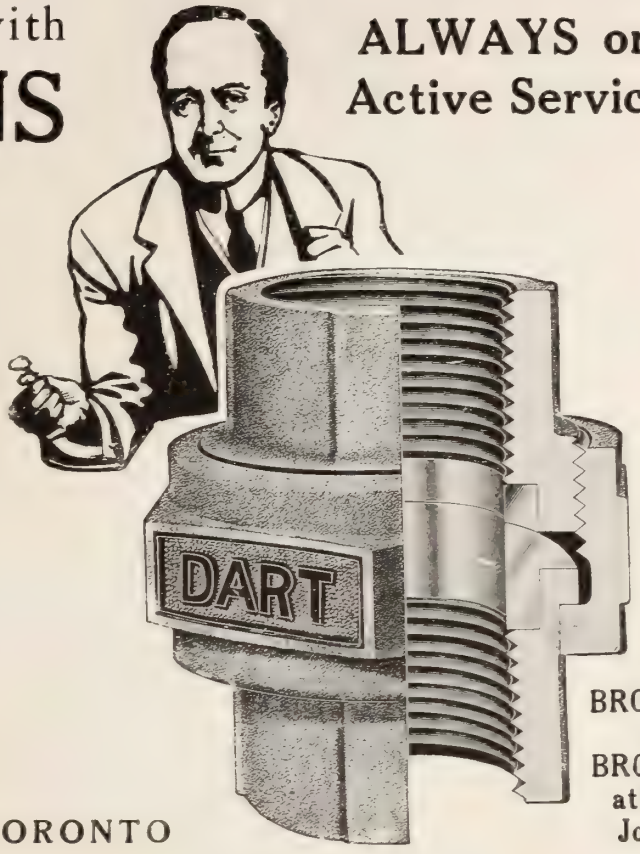

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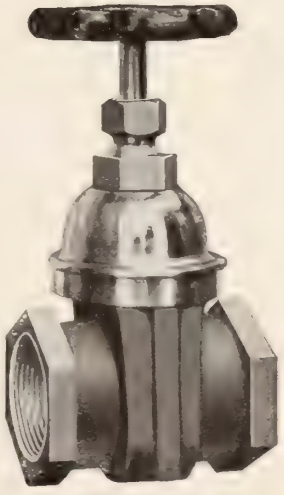

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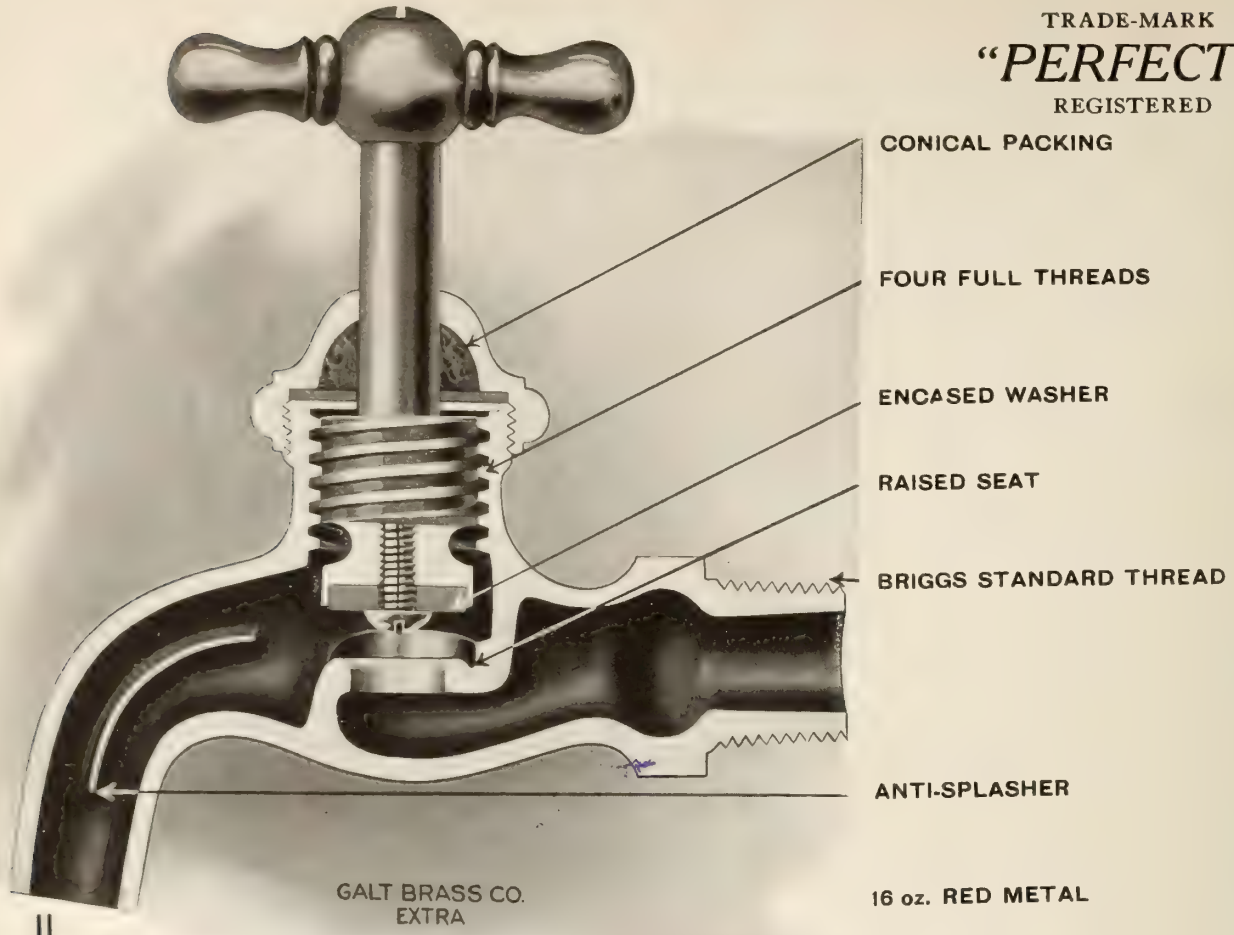

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THE SANITARY ENGINEER

PLUMBER & STEAM FITTER of CANADA

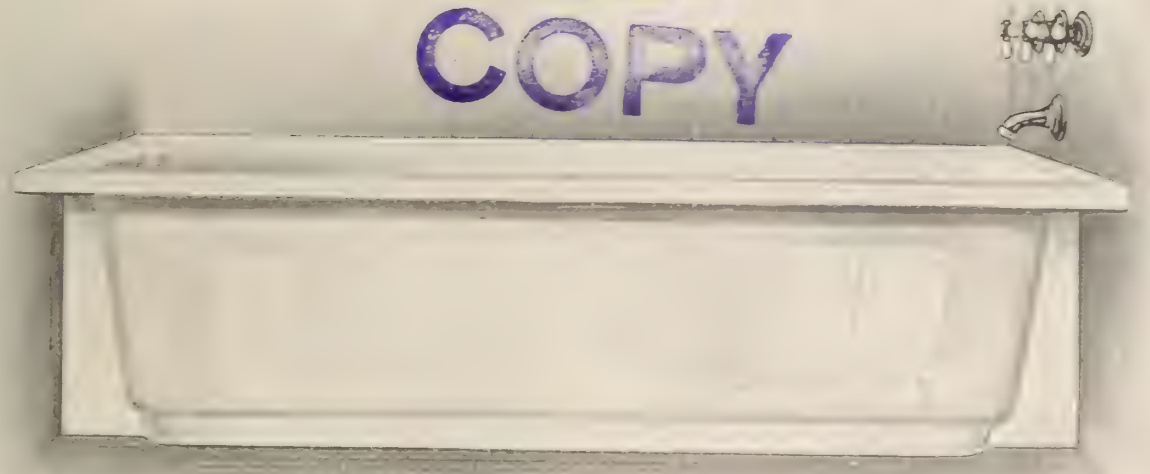
THE MACLEAN PUBLISHING COMPANY, LIMITED PUBLISHERS

Vol X. Publication Office: TORONTO, JUNE 1, 1916 No 11.

Enameled All-over

VICTOR ONE-PIECE BATH

Enameled Inside



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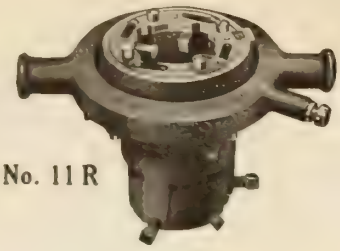

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"Jardine" Adjustable Ratchet-Threading Tool

Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely enclosed, excluding chips and dirt.

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is Capable of Sustaining a Horse-power for nearly an Hour.

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Back to Boiler
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The Morehead System keeps steam heated equipment absolutely free of condensation returning **under pressure** the chemically pure hot condensation to the boilers as feed water.
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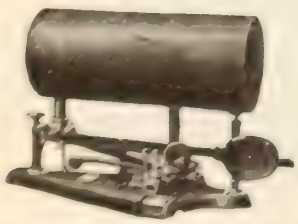

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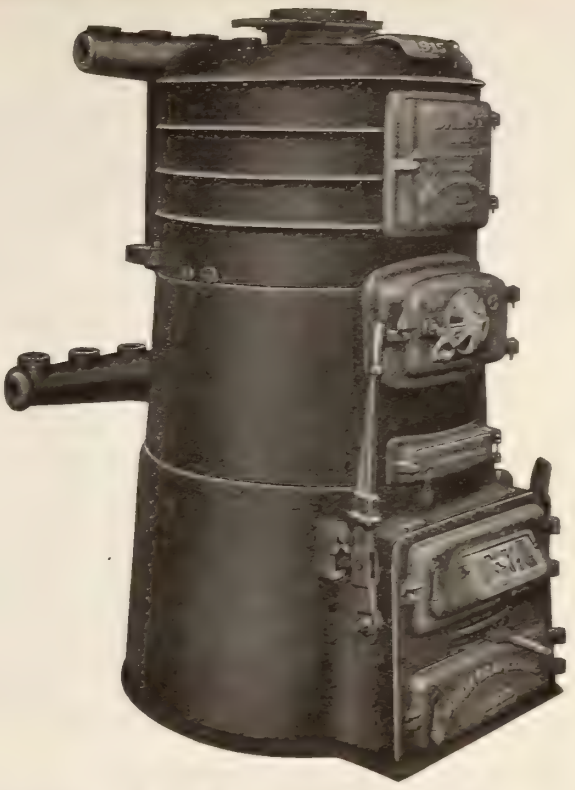
Maximum amount of heat.



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The ball with the reinforced top which makes elongation impossible.

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TUEC Stationary Cleaners provide means whereby the health of the home is ensured from dust, in which lurks millions of Death-dealing germs.

NO HOME can lay claim to being sanitary where the broom is used.

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EVERY EQUIPMENT nets you 27% profit and a satisfied customer.

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"The Heating System you want is The DUNHAM VAPOR HEATING SYSTEM *—a low-pressure steam job—operating on a few ounces of vapor, being automatically controlled at the boiler and regulated at will through a temperature control from upstairs. Two pipe lines—one supply and one return. With the Dunham Packless Supply Valve at top of radiator, easy to get at and absolutely tight — no packing no leaking. Then the Dunham Radiator Trap on the return end of the radiator. The watch-dog of the coal pile—gives you every bit of useful heat and gets rid of the causes of noise in most heating systems—water and air. And about that air—notice the absence of air valves on radiators in the Dunham System—some feature. No spoiled carpets and furnishings or trouble of looking after each radiator when starting up your system.*

"Cost—well naturally, with all these advantages, you would expect to pay more for a Dunham Vapor System than for the ordinary troublesome one pipe system or hot water job, but any additional cost is quite in proportion to the comfort gained—in fact it is overbalanced.

"These are the main points—the details are quite, if not more interesting."

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Write to-day—it is worth while.

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"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

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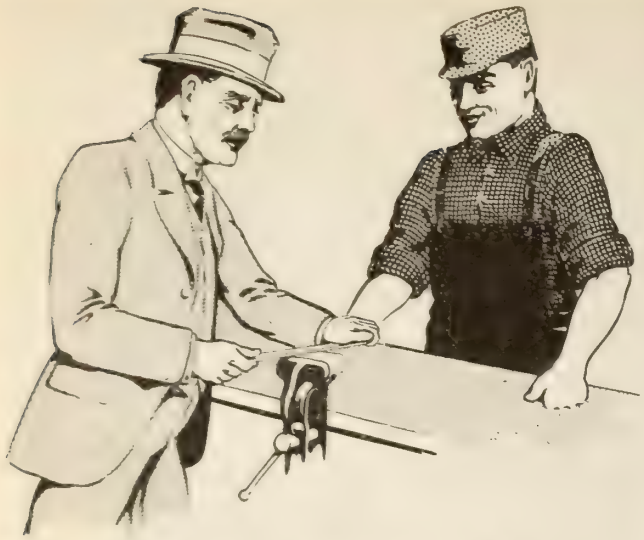

Put Yourself in His Place

Here is a man at a bench, filing.

The file is worn.

He makes three strokes where, with a sharp file, he need make but one.

It takes him three times as long to do the job.

When it is finished, he is not as well satisfied with it as he would have been if he had a proper file.

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The new file costs a few cents. The man does his work in one-third of the time. He is more satisfied with his job. The foreman is pleased with the man—and the employer has saved money on the time sheet.

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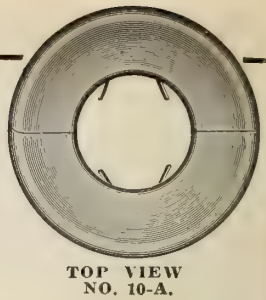

TOP VIEW NO. 10-A.

THE NO. 10—A NARROW FLANGE PLATE IS A STEEL HINGED PLATE. FLANGES ¾" WIDE. HIGHLY FINISHED. ESPECIALLY DESIGNED FOR TWIN CONNECTION "NARROW."

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High quality at the right price.

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Gem No. 4 Automatic Air Valve

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It Tells All About the PAUL

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Mr. Plumber —

Here is a perfect, low-priced electric motor pump adapted to all the requirements of the moderate priced home. Easy to install—noiseless—economical. **There's money in it for you if you push this pump.**

Give us your part of entry and we will quote you a price delivered to that point.

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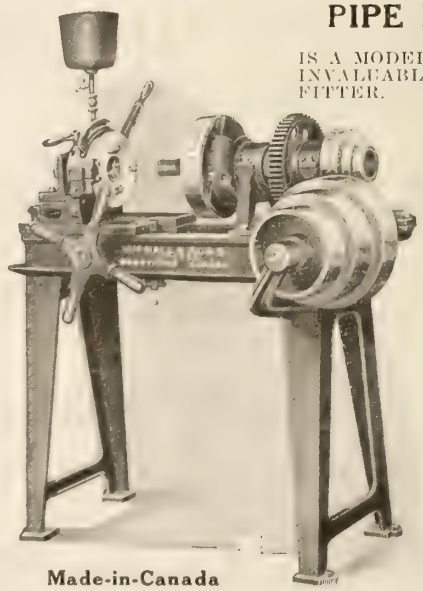
Save TIME and PIPE and CUT TRUE THREADS

THE HALL NO. 2 PIPE MACHINE

IS A MODERN TOOL THAT IS INVALUABLE TO THE PIPE FITTER.



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Built in Canada for a maximum amount of accurate and efficient service to Canadians, and they cost less than imported machines.

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ALL QUALITY BRASS VALVES

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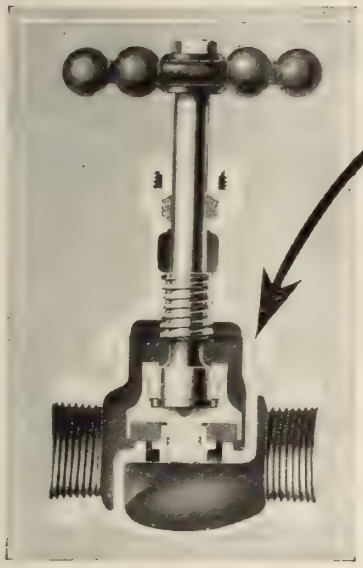

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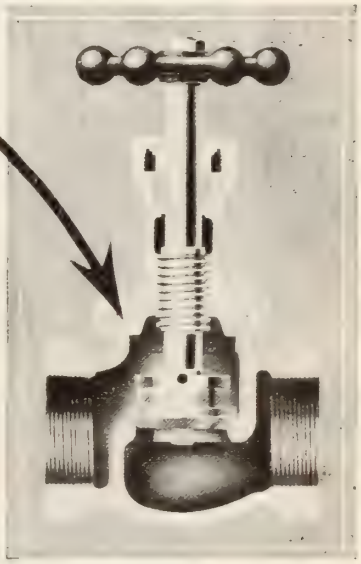
with the Metal Disc



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STRONG
Where others are weak.

Outside Thread Construction

Why These Valves Are Superior

1. The connection is non-corrosive because the **threads** (see cut) are on the outside, away from the action of steam and water, making it impossible for them to become limed up and corroded.
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3. Prevents straining or spreading of bonnet end of valve which causes a loose fitting and unsafe bonnet—Safety First.
4. It prevents stripping off threads.
5. It permits easy accessibility to the valve at any time without injury to any part of it.
6. It is the only correct mechanical method of fastening bonnet to body of valve.
7. The external thread construction permits of a more compact shaped valve, consequently a stronger one.

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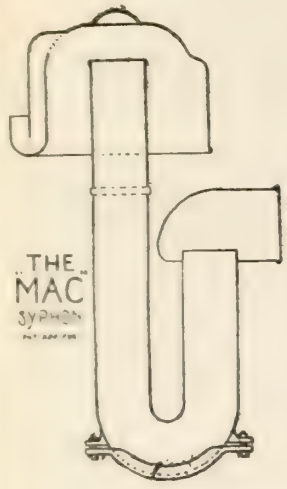
Manufactured by

PENBERTHY INJECTOR CO., LIMITED

WINDSOR, ONT.

A Syphon that Syphons Every Time



Do you ever count the fitting, note the time and material when you make a syphon up from soil pipe and fittings?

Our price for a real syphon will cut down cost.

We also manufacture a good line of soil pipe and fittings.

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Guaranteed Five Years.

Look for the Trade-Mark.

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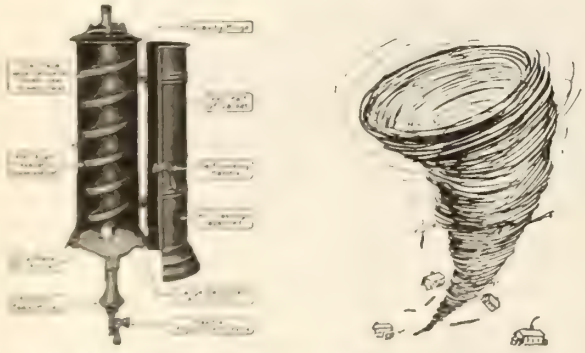
HEATS IN A HURRY
WATER HEATER



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A Tapered Flue Spiral
How different and different in principle than *any* other.
Conquering Nature's principles of centrifugal and centripetal force.
Direct heat impinges at every twist of the Spiral.
Can't come in contact without the coil *naturally*.
An *even* distribution of heat all around.
With *more* heating surface than has ever been put into a cast coil.
And the Hotstream coil is of standard size.
This is an unobstructed flue system, water flow
must not depend on any device to form sediment pockets.
Correct proportion for soft water districts.
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Goes on clean, and we give a sweet *anti-rust* preparation
Tests in connecting "no DANGER of rusty or discolored water."
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SANITARY ENGINEER

PLUMBER AND STEAMFITTER OF CANADA

Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, JUNE 1, 1916 No. 11

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EDITORIALS

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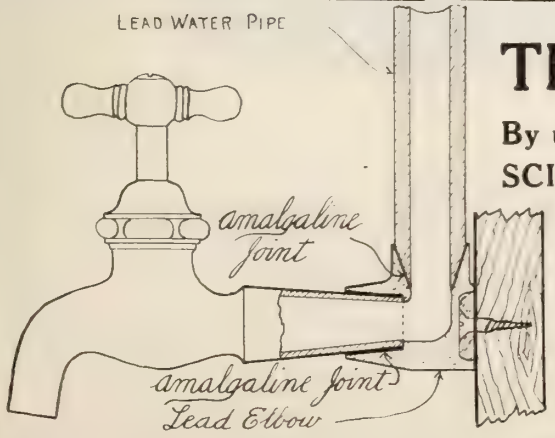

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THE SANITARY ENGINEER

VOL. X. JUNE 1, 1916 No. 11

Public Comfort Stations

Showing What is Being Done by Our Cousins to the South, An Above Ground Station. These Public Comfort Stations Should Also be Furnished With Rest Rooms When Situated in a Shopping District

By courtesy of Committee on Public Comfort Stations, New York

IF public toilet accommodations are necessary in public and semi-public buildings where a large number of people congregate, how much more necessary are toilet accommodations or public comfort stations in city squares, public parks, and other places, which at times are congested by masses of people brought together by business or pleasure?

Some idea of the necessity for public comfort stations in large cities may be gained by a statement of the number of people that avail themselves of the advantages thus offered in cities where stations have been erected. For instance, the number of people that visited the underground public comfort station at Thirteenth Street and Pennsylvania Avenue, Washington, D.C., during a certain month was 86,500. Of those, 4,600 visited the station during one day—that being the greatest number for an open period—and 1,100 was the minimum number of people that visited the station during any one day.

During the same month, the public comfort station at Seventh Street and Pennsylvania Avenue, in the same city, had an attendance of 88,000, of which 4,300 attended on the maximum day, and 1,600 on the minimum day.

Of the people visiting both those stations, about 12 per cent. were women. In other words, during that month, 10,380 women visited the Thirteenth Street station and 10,560 women visited the Seventh Street station.

That the free use of public comfort stations is not confined to certain cities or localities, but is common to all, is evidenced by the attendance in other cities and in all quarters where such conveniences have been provided. In Brooklyn, an average of almost 200,000 persons per month, make use of the public comfort station at Lorimer Street and Broadway.

Many more instances could be cited, and statistics could be multiplied to show by the number who use them the real necessity for such conveniences, but the truth is so self evident that further comment as to their advisability seems unnecessary.

Location for Public Comfort Stations

Public comfort stations are necessary in the business, theatrical, and shopping districts of large cities, and at public parks, recreation piers, and like places of public assemblage. In the shopping, theatrical, and business districts, those corners or crossings where traffic is greatest will be found most desirable places for location of the stations. If there is a public square near by or a gore plot, such as is formed by the intersection of three or more streets or two streets at less than right angles, the public comfort station may well occupy this gore plot.

It may be laid down as a rule from which there can be no deviation, without entailing loss and trouble, that no public comfort station should be erected without making provision for an attendant and having someone in charge during the hours the building is open to the public.

It is a fact, born of experience, that petty thieves will pilfer and vandals destroy the fittings and fixtures in public buildings as fast as they can be re-

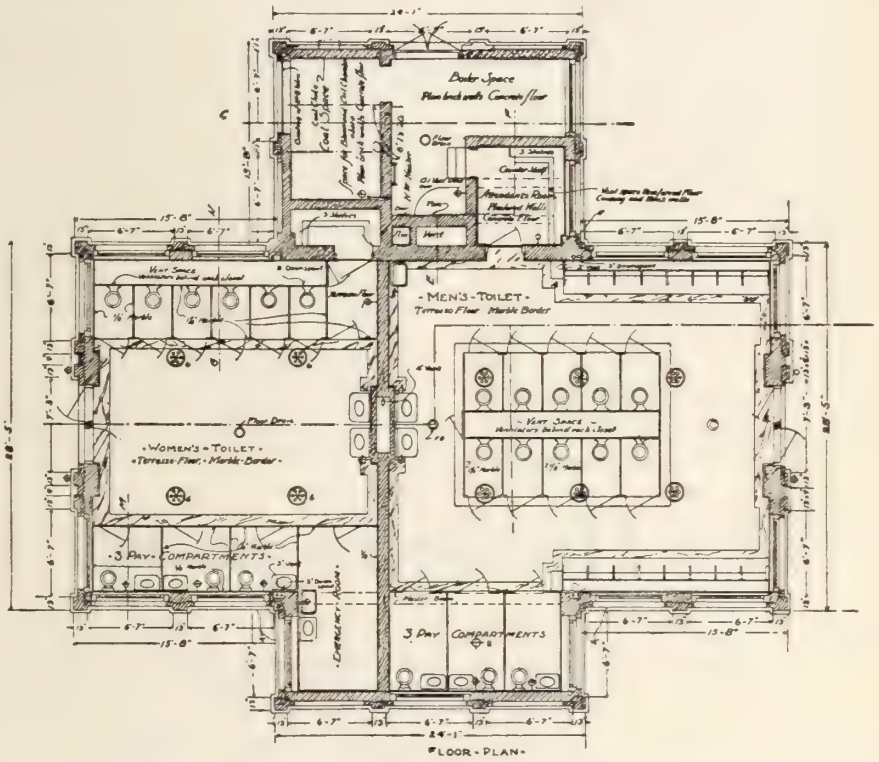


Fig. 3.
Plan Public Comfort Station No. 1, District of Columbia
A. R. McGonegal, Sanitary Engineer.

paired or replaced, if somebody is not in attendance to watch them. It will prove a matter of economy, therefore, instead of building several small one or two-fixture, dark, cold and ill lighted apologies in a district, to build one good substantial station, well lighted, comfortably heated, freely ventilated, and perfectly sanitary in all respects, then put some one in charge to superintend the plant.

Heating and ventilation are two features which must be well considered in the planning of a public comfort station. Without heat not only does it entail discomfort on the attendant and visitors, but further exposes the piping and fixtures to the danger of being damaged by the frost. If the building is not well ventilated, on the other hand, people will refuse to avail themselves of its doubtful advantages.

Examples of Public Comfort Stations

"An Above-Ground Station" — The front and rear elevations of a public comfort station built above ground are shown in the east elevation, Fig. 1, and the west elevation, Fig. 2. The only reason for showing these elevations is because buildings of this character are not very numerous, and the elevations are interpolated as a helpful suggestion to those who are called upon to consider a public comfort station without having seen one.

The valuable features of this station lie, however, not so much in the elevation, as in the interior arrangement, shown in Fig. 3. It will be noticed that the building is well lighted, both by windows and by artificial light. This is absolutely necessary if a clean, sanitary, and pleasing interior is to be maintained. There is no greater foe to dirt and filth diseases than well-lighted nooks and crannies where dirt cannot be concealed. Next to light, air is the chief consideration, and, as may be seen by an examination of the layout on the floor plan, every closet compartment, all of the urinals and the rooms in general, are liberally provided with ventilation. This in itself, however, would not be sufficient if means were not provided for moving the air from the rooms, urinals, and closet compartments.

In order to heat the building and supply hot water to the lavatories, a boiler and water heater are necessary, and these are provided for in the boiler room.

It will be seen that the building is divided by a masonry wall into two compartments, one for men and the other for women. Each compartment is further provided with an attendant's room, and a closet with shelves for storing supplies. There are two special features to this public comfort station, which will commend themselves to everyone. In the women's department there is an emergency room, or retiring room, fitted with a cot, where a patient can be taken in case of emergency, while medical attendance is summoned. Telephones are likewise provided to speedily communicate with distant points.

The second special feature is pay compartments in both the women's and men's rooms. These pay compartments are fitted up with water closets and lavatories, and the use of one, together with a fresh cake of soap in an unbroken wrapper and a clean towel, can be had for the small sum of five cents. The pay compartments are about 7½ feet long by 4½ feet wide, and can be conveniently used by hot and dirty travelers in which to take a refreshing sponge bath.

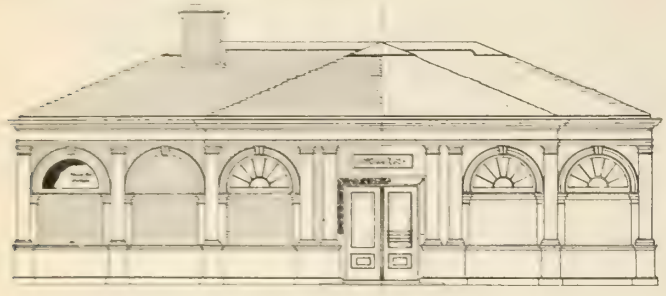


Fig. 1.

Fig 2.

Public Comfort Station No. 1, *District of Columbia, Henry B. Davis, Architect.*

The House to Sewer Connection

Omaha, a City of Over One Hundred Thousand, Does Not Believe in the Main House Trap. Free, Fresh Air Passing Through Sewers and Drain Pipes Dispenses With Dangerous Sewer Gases

By Andrew Rosewater, member of American S.C.E.

FROM a surface standpoint, there is very little to be considered to determine what is to be done to connect a sewer already completed with the house which has its plumbing work ready for sewer connection. This was the opinion thirty years ago when the practice prevailed of issuing a sewer permit to anyone desiring to connect a building with the sewer. The engineer was simply expected to furnish the information as to where the "Y" was located to which connection was to be made. The question of grade, of direction of line, was left entirely to the drain layer who did the work, and he frequently began at the building and laid the pipes in a "go-as-you-please" way, until he came within eight or ten ft. of the junction, and then, to use a common phrase, "made fit."

This class of construction frequently developed depressions between the sewer and house, due to abrupt changes in alignment to suit the workman in making connection. Cementing of joints was largely a matter of honesty. No tests were made after the work was done, and no report filed to show how it was done. As a result, the engineer or his inspector were recipients of blessing from house-

owners, who experienced frequent and uncomfortable stoppages in their pipe connection, and always attributed it to the main sewer.

At a time when such construction was prevalent in Omaha, the city had a separate system of sewerage for house waste, which had been designed by Colonel Waring upon the beautiful theory **that the sewer could not be made too small to insure the greatest flow attainable with a self-cleansing velocity for sanitary results.** The mains through the city for this service were six inches in diameter and at first were designed without manholes, the only adjunct being an automatic flush tank at the upper end.

About the time this sewer system was completed, hydraulic elevators were introduced in the hotels and leading business houses in the city, with disastrous results, causing cellars to be flooded following the incapacity of the sewer to carry the flow at specific moments or to overcome the very common mediums of resistance which found their way into the six-inch pipe. The junctions from the pipe sewer to the houses were four inches in diameter.

It is needless to say that the engineer had his troubles from the very start in connection with this class of construction. Within three years from the original completion of the sewers in the central part of the city, some of them were ordered to be replaced with 12-inch pipes to meet the required service. This, of course, is a deviation from the subject of my article, but it is necessary by way of explanation in making my brief treatise on house connections more comprehensible.

In 1892 the writer had occasion to resume charge of public works, including, of course, the sewerage system of the city after an absence of five years, and one of his first efforts was to revise the system of sewerage construction, including that of house connections.

For this purpose, an ordinance was drawn up requiring a permit to be taken out for sewer connection, with plans of proposed connection in detail and authorizing the engineer to determine the line and grade of such connection and to test the same by light tests as to alignment and grade. This at first was somewhat difficult, but it has become a permanent practice, with very satisfactory results.

In carrying out this work it is well to secure, wherever practicable, a direct line and uniform grade from the house to the sewer, and where a straight line is impracticable, a short curve with T section is provided so as to admit of independent test from the ends of the curve to the terminals of the straight lines. In cases where a number of buildings are sought to be connected from one main connection, manholes are interposed so as to admit of rodding and inspection at any time between the terminals of the straight lines between the house and the sewer. A record is kept in the office showing profiles and the exact location of buildings, with names of inspectors, date and condition under which said work was done. This admits of any person who may purchase property years after sewer connections have been made, to ascertain by application at the engineer's office the location of the sewer and details of its construction.

These changes, of themselves, have been of excellent results, and have reconnections fully 90 per cent. from what prevailed previously. This practice has been copied in many other cities.

There is one feature still in connection with this form of house connection that is open to improvement. That is the lack of examination and test of the house connections as to the imperviousness of its joints. A large number of improperly constructed joints admit of a steady leakage into the trenches, causing periodical settlement, and, as a result, large numbers of such connections bring about continuous settlement of trenches in the main line of sewers.

I have only thus far referred to the construction of a plain line of conduit from the house to the sewer. **The question of trapping these pipes at some point intermediate between the house and the sewer has often been the subject of debate, but from a very extensive experience and study of the subject, my judgment leads me to the conclusion that an unbroken and continuous connection from the house to the sewer should be laid and extended through to the roof. That the only traps should be those which connect the house fixtures with the soil pipe leading to the sewer.**

Omaha has had in successful operation for many years a system of untrapped connections from the roof to the sewer and from the sewer inlets at the street corner to the sewer, upon the broad theory that thorough seration of the sewer through the constant unbroken air currents will give more satisfactory results from a sanitary standpoint.

Who Wants the Country Business?

The Writer Has Had Considerable Experience Amongst the Rural Residents in the West—The Sanitary Engineer Maintains Too That There's Lots of Corn in Egypt, But it Requires Reapers

By James Glenister, manager of plumbing and heating department, Ashdown Hardware Co., Ltd., Winnipeg.

THERE are profitable opportunities awaiting the man who settles down in a small Western town and confines his efforts to country business, such as heating plants, water supply equipment, plumbing and lighting. In addition to the above, which is naturally along contracting lines, he can take up the sale of cream separators, milking machines, washing machines, and many other labor-saving devices, that the farmer is buying nowadays. In the writer's opinion, this business does not require an expensive or elaborate store room on a busy corner, but it is necessary to have a place where samples can be carried and demonstrated to buyers. A place in the corner of many implement stores would answer nicely. This idea is not new; in fact, it is being practised quite extensively in some parts of the country. In many sections, well-drilling can be added, and one or two machines kept busy most of the year. A good line of gasoline engines will couple up with all the merchandise above mentioned.

To make a success at this business, one must make up his mind to work the country trade almost entirely. He must create an acquaintance with the farmer, and build a reputation that will command their confidence. When this is done, such a dealer will not be bothered a great deal by mail order houses. Neither will he have to sell cheap, flimsily-made goods. If you will observe closely, you will find that the farmers are buying a pretty good grade of automobile, are building good houses and barns, and raising blooded stock. You will find, further, that one of the principal reasons they buy from mail order houses is because they can get a definite price on things they want to buy, in plain net figures, without labor hitched on. They may pay more in the long run, it is true, but it's too late then to cry over spilled milk—the damage has been done.

If a farmers' sales agent or dealer prepares his prices so that he can quote as merchandise, as well as a price covering equipment installed, assuming that his standing is good in the community (so that his guarantee is worth something), there is not much danger of mail order houses getting rich on the kind of

THE FIRST ANNUAL CONVENTION OF THE CANADIAN SOCIETY OF DOMESTIC, SANITARY AND HEATING ENGINEERS TOOK PLACE TWENTY-ONE YEARS AGO.

equipment mentioned here, because every one knows, or should know, that plumbing, heating, water and light systems, to be satisfactory, must be installed by one who has had experience. Few farmers attempt to build their own houses or even their barns, and the latter does not require high-class skill. Farmers seldom do their own tiling, but hire expert ditchers; they don't as a rule dig their own wells; they don't grind their own flour; and a hundred-and-one other things, which will go to show that if the sanitary and heating engineer will study the farmer and farm conditions he will find a great market as yet comparatively unworked in the field mentioned, and, besides, a pretty good class of people to deal with—most always good pay and good boosters. If one does as agreed in a community of farmers, goodwill is an asset worth while to the business man in any line.

Analysis of Canadian Sanitary By-laws

Being a Proposed By-law to Regulate Sanitary Engineering Construction in the City of Ottawa—The Sanitary Engineer Takes Full Responsibility for All or Part of Any Criticism Made on this By-law.

IN looking into this proposed by-law thoroughly and giving much thought to it, section by section, the writer has become more and more convinced that the architects of Ottawa were standing in the public's light when a protest was sent on to the Board of Control, praying that the mayor refrain from signing his name to the present proposed by-law, thus making it law.

There no doubt appear to be some very drastic changes advocated here and there, but no one will benefit by these changes to as great an extent as the public at large, hence there is every justification for these apparent drastic changes, which further prove that the present plumbing by-law is too lax.

The next section to comment upon is that of section 57, which reads as follows:

Section 57. No slip or washer joint shall be allowed on sewer side of any trap or of any vent pipe. Trap vents in all cases (water closets excepted) must be taken off the discharge side of the trap or waste pipe, as shown on diagram. Crown venting will not be permitted. No wrought iron vents will be allowed below the top of the cellar floor, or to be buried under the earth.

Section 58. The rule of soil pipe terminus, as hereinbefore mentioned shall govern vent pipes.

Section 59. No brass pipe used for waste pipes or for vent pipes shall be less than No. 19 Imperial gauge in thickness, and all brass pipe and all fittings must be properly tapped and threaded.

Section 60. Closet tanks shall be lined with sheet copper of not less than 12 oz. weight per square foot, and the weight shall be stamped in a conspicuous place at or near the top of the tank.

Section 57 is one in which some very commendable changes have been made as regards venting. The old by-law permitted crown venting, and, as every practical sanitary engineer knows, crown venting has proved to be a very unsatisfactory and impractical method. But of course it took time and experience to prove this, and much of the cry against trap venting was brought about by the very fact that the crown vent frequently became choked up after being in operation only a few months.

However, this method of crown venting is fast disappearing and new and more efficient methods are being advocated and adopted.

This section refers to diagrams but, the diagrams are not embodied, or shown in the printed matter. No doubt this is simply a typographical omission.

Section 58 is general and simply one of definition.

Section 59 is to be commended and no doubt guards the public, by giving them a gauge of brass waste pipe which will be a better and more reliable investment than has heretofore been the case when simply thin brass nickel-plated tube was being sold, some of which was a masterpiece of thin drawing work, and certainly too thin for service and durability.

The same arguments may be used when commenting upon section 60, in which 12 oz. copper is demanded. At the same time we are of the opinion that 10 oz. copper, if a good quality, joints not too tightly folded so as to break at the seams, then well sweated with solder, would answer the purpose very well and with copper the price it is to-day, no doubt would result in expensive tanks. At the same time the public would be so much the better off in actual value received.

The chief point of commendation is that some fixed weight of copper must be used. The public have no doubt been the sufferers to no small degree by having light weight copper linings in w.c. tanks.

Section 61. All vents for water closet traps in sizes under 3 inches shall be made of galvanized iron. For 3 closets or less a 2-inch vent pipe shall be used. For from 3 to 6 closet a 2½-inch vent pipe shall be used. For more than 6 closets a 3-inch vent pipe shall be used.

Section 62. All vents of 2½ inches diameter and under shall be made of galvanized iron pipe; where diameter is 3 inches or over, cast iron pipe may be used.

Section 63. All vent lines shall be carried down to basement and shall revent into a "Y" branch immediately over clean-out "Y", put on for that purpose; said vent shall be the full size of the main vent line and shall run as straight as possible with a two-inch branch or tee, left plugged as close as possible to the basement ceiling, for future use; all elbows on this line to be of 45 degrees whenever possible.

With sections 61 and 62 we see no need for comment because of the fact that they are of a more or less general nature.

Section 63, however, is of sufficient importance to make a remark about.

The re-connecting of the vent stack at the foot of the soil pipe is a move in the right direction. It makes the venting system more effective in many ways, and with such a connection much back pressure upon lower fixture traps is eliminated.

Then the providing of a two-inch branch or plugged tee at the basement ceiling is a splendid idea, and unless we are mistaken is the only by-law in Canada in which there is such a requirement.

With such a branch provided other fixtures may be added such as w.c. or laundry tubs and no need to break into or extend a long vent up to a point above an existing fixture vent.

Section 64. Trap vents must be made of brass, lead, cast iron or galvanized wrought iron, with brass, galvanized, cast or malleable iron or brass fittings.

This section, too, is of a general nature, at the same time it is necessary.

Section 65. Whenever old bathroom fixtures are to be replaced by new fixtures, a permit shall be taken out, and the old waste connections shall be inspected by the Medical Officer of Health, or by the chief, or an assistant, plumbing inspector, and in all cases the new fixtures must be back vented, and all lead waste shall be renewed if found necessary, and the bathroom shall be ventilated and lighted according to By-Law. Whenever existing toilet plumbing is renewed, altered or repaired all soil pipe in place over the basement floor weighing less than 45 lbs. a length of five feet shall be replaced below the water line by pipe weighing not less than 45 lbs.

Section 66. All pedestal slop sinks shall be served by a 3-inch waste line and all common slop sinks by a 2-inch waste line.

Section 65 is another splendid section. It proves that the compilers of this proposed by-law have had more than ordinary experience.

One of the most abominable practices in the trade is that where a property owner in improving his property will ask for a figure on new fixtures only to be connected to the present existing piping, and oftener than not the piping under the floor is poorly installed, with badly made joints, made before any plumbing by-law was in operation, etc., and the result, is that up-to-date fixtures are installed, no test made, and no inspection or consideration given to the durability or sanitary condition of the piping to which these fixtures are connected.

This re-modelling work has for years been the happy hunting ground of the botchers and the public have not been truly conversant with the real conditions, except of course the cheap jack speculative builder or property owner.

There is no foundation for argument against such a section in the least, and no reason whatever why, when new fixtures are being installed, the whole plumbing system should not be properly inspected, tested and passed, and be left in every way as perfect as a new installation.

Why should one person building a new house have to conform to certain by-laws while at the same time another person possibly the very next door is allowed to botch up his plumbing installation?

The fact is that we should have, as The Sanitary Engineer has for several years advanced, annual inspection of plumbing and all such apparatus kept up-to-date or at least in a sanitary condition of repair.

Section 67. When a backing of wood cannot be placed in setting up fixtures in any building they shall be fastened in place with either toggle bolts or expansion shields. Wooden plugs will not be allowed.

Section 68. All water closets, all slop sinks in separate compartments and all urinals shall be supplied with three-inch local ventilation pipe having an area equal to that of a three-inch round pipe, and connected to a heated flue; when a number of pipes combine, the main or trunk pipe must be increased proportionately.

Section 69. No lead, waste or vent pipes used in any building shall weigh less than shewn on the following table:—

Pipe of 1¼ inches inside diameter, 7 lbs. per yard.

Pipe of 1½ inches inside diameter, 8½ lbs. per yard.

Pipe of 2 inches inside diameter, 10½ lbs. per yard.

Pipe of 2½ inches inside diameter, 15½ lbs. per yard.

Pipe of 3 inches inside diameter, 18½ lbs. per yard.

Pipe of 4 inches inside diameter, 24 lbs. per yard.

And all traps and bends used shall not weigh less than shown on above table.

Section 67 is also a very practical one and will result in the saving of many thousands of dollars which have been wasted by fixtures not being securely fastened to walls. The writer has many times been called in to make repairs to fixtures which have fallen away from the walls, and has broken the water supply, causing damage to floors and ceilings, etc.

Section 68 is not quite as practical by any means as it should be.

For instance, if a person so desired to connect a system of local ventilation pipes into a flue of any size or height they could do so under this section. Of course it would require to be a certain area, but, suppose because of the last or shall we say highest local vent being a few feet from the outlet of a chimney, the very fact of it being a heated flue would not necessarily make it effective.

Then again, the location into which this local vent can be inserted should be taken into consideration.

It would never do to have a local vent terminate in a chimney which had a fireplace or mantel situated above the place where the local vent pipe entered. If local venting is desirable, and no doubt it is, it should by all means be practical and effective at all seasons of the year, and unless a more stringent clause be put into operation, there could be no guarantee that such installations as would conform with section 68 would effectively ventilate the fixture or compartments in which the fixtures are located.

(Continued in next issue.)

The Annual Convention

THE Twenty-first Annual Convention of the Canadian Society of Domestic Sanitary and Heating Engineers will be held at London, Ont., June 19, 20, 21 and 22. The building in which the proceedings will be carried on is the Foresters' Hall, Imperial Bank Buildings, corner of Richmond and King Streets.

From reports received to date this convention is likely to be one of the most interesting of any yet held. A large number of members have already assured the executive of their intention to be present.

Last year the convention was held in St. John, N.B., and in spite of the long distance from the larger commercial centres, a splendid attendance was evidenced.

London is without doubt a city of great renown. It is the practical seat of the spirit of public ownership, whose champion is Sir Adam Beck.

It is not only a centre of public ownership in name, but in deed. London as a city is practically owned by its workers, 75 to 80 per cent. of whom own the home in which they dwell.

No citizens can rightly claim to be believers in public ownership of public utilities, and at the same time not own the houses they dwell in, because the property owner is the true owner of public utilities.

The City of London owns a port—Port Stanley, some 23 miles or so away, with the railway connecting same to the city, thus ensuring a cheap and rapid freight-carrying service for its industries. Power is said to be cheaper than in any other city in Canada, thus making the City of London a very desirable location for industries, particularly so when its citizens, as before mentioned, own the homes they live in. Such industrial workers without doubt are the most efficient and settled class that could be desired.

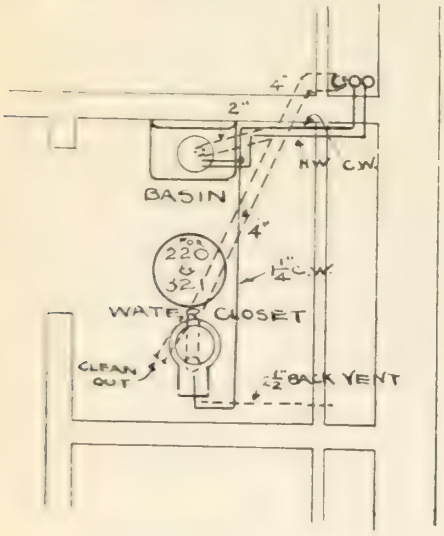
A full and pictorial description of this year's convention city will be given in the next issue of The Sanitary Engineer.

New Toronto Technical School

Specifications Described, Previous Articles Merely Mentioned the Equipment in a General Way—Plans and Layout Will be Described, Making the Following Articles Doubling Interesting.

Sanitary Engineering

It is questionable whether there is a more efficiently equipped building in Canada as regards the excellence of serviceable fixtures and location of same. Bubbling drinking fountains are located throughout the building in various parts as well as in the different laboratories. Then in connection with the drainage system there is a 4 inch bilge pump situated in the boiler room electrically driven and automatic in



PREPARATION ROOM TOILETS

operation. Just to illustrate how every particular item in connection with such a pumping equipment was covered by specification we will reprint the sections dealing with this matter.

Section 29.—Furnish and install where shown in boiler room in catch basin, one vertical direct complete with motor, automatic controller, cast iron catch basin and settling chambers, cover with manhole.

Controller to be mounted directly on this cover and actuated by a direct [illegible] float. Cast iron chamber air-light and pro-[illegible]

Bilge pump to be complete in itself and to have a capacity of 150 gallons per minute against a 25 foot head; pump discharge to be four inches in diameter. Place on the suction of pumps, a brass suction strainer. The motor to be at least a three (3) horse-power and to operate the pump at full load within the approved temperature guarantees without undue noise, humming or vibration. Motor and pump shafts to be direct connected by means of flexible coupling above the floor, and all bearings to be fitted with renewable bronze bushings and to be self-oiling.

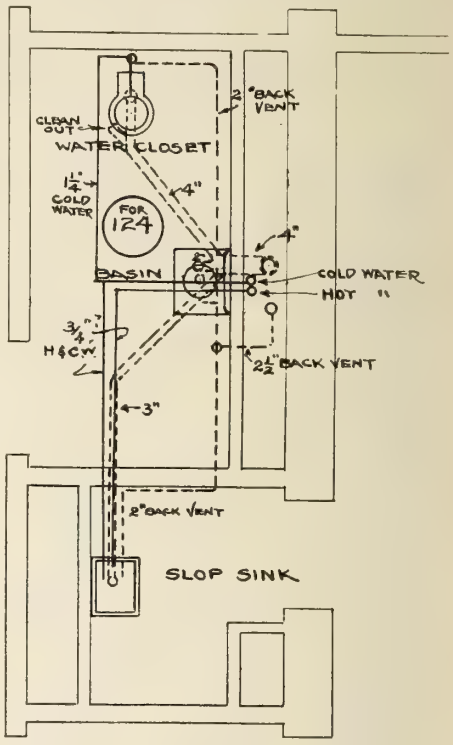
The pump and motor must be guaranteed to work automatically without excess noise, and be subject to further guarantee for one year against all defects in workmanship or material.

The contractor is to make connections to the sewer with the pump discharge.

Provide all piping of wrought iron, galvanized inside and out, fittings of malleable iron, valves to be iron bodies.

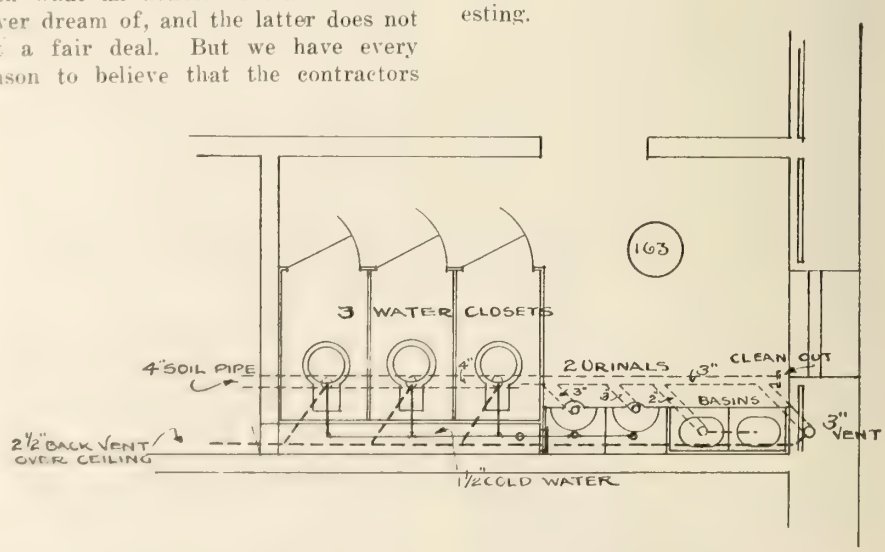
It will be noted how every safeguard is provided, and while to many such a specification may appear to be unduly strict such is the only way to ensure that every contractor is tendering upon a fair and equal basis.

Many time specifications are drawn up in such a way that almost any construction can be read into them, and in several cases the schemer can get away with what an honest contractor would never dream of, and the latter does not get a fair deal. But we have every reason to believe that the contractors in connection with the plumbing and heating appliances lifted up to the letter and spirit of these specifications.



PREPARATION ROOM TOILET

A list of the sanitary fixtures installed throughout would no doubt be interesting.



MEN TEACHERS TOILET ROOM

LONDON WILL SEE THE CANADIAN SOCIETY OF DOMESTIC, SANITARY AND HEATING ENGINEERS TAKE ON ITS MANHOOD.

They are as follows:

Water closets	79
Showers	21
Lavatories	134
Sinks	31
Urinals	62
Stop sinks	9
Drinking fountains	8
Bath Tubs	2
Wash troughs	3
Needle showers	4

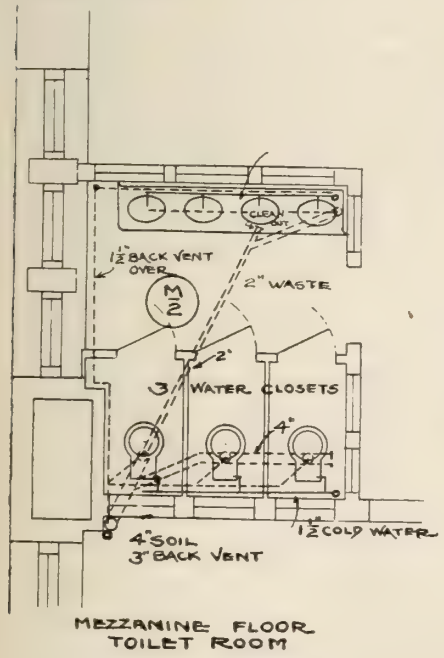
Apart from the above, there are also fitted all manner of trays in connection with the experimental and chemical laboratories.

Provision had to be made for all the wastes, hot and cold water supply, etc.

Compressed air and gas piping in quite a number of cases had also to be run to these fixtures.

Heating System

The heating system is an interesting feature of the plant, the principle adopted being hot water heating with forced circulation. The water is first warmed in large heaters and then made to circulate through the radiators by means of centrifugal pumps, afterwards being returned through the heaters with a small loss of temperature. The heaters and pumps are located in the pump room where are also the various return mains all under direct control of the operators. Exhaust steam from the engines and pumps is used in the heater, and afterward returned to the boilers through oil filters.



Exhaust Steam Heater

The exhaust steam heater is 14 ft. 8 in. long overall and 64 in. diameter inside. It is composed of a steel shell, cast iron inlet and outlet chambers, and removable tube cover chamber fitted with a 10 in. nozzle for water connection. The heater contains 1,080 one-inch outside diameter brass fully annealed tubes of No. 13 Stubbs or Birmigham gauge. The clear length of the tubes is 10 feet. The shell from which the body is made is ⅜ inch steel plate, double riveted seams with angle iron riveted to each end for bolting the tube plates and flanges of chambers.

Provide live steam inlet flange, manhole, one saddle flange for condensation and four cast iron brackets, two for each side for pipe supports.

Tube sheets to be drilled and fitted with at least 640 one-inch outside diameter fully annealed brass tubes of No. 13 Stubbs or Birmingham gauge; tubes to have clear length of 10 feet inside tube sheets. Holes for tubes to be countersunk for stuffing boxes and to receive brass screw ferrules.

Tubes are to have brass screw stands and cord of tape packing at each end and must be perfectly tight.

The chambers are to be made of cast iron and to have removable tube covers bolted on, also flanges for bolting to tube sheet and angle iron of shell. Each chamber to have 10-inch diameter nozzles drilled for standard flange bolts, Outlet chamber to have a two (2) inch draw-off tapping.

Provide four 6-inch wrought iron pipe columns for tank with flanges at each end, one drilled for bracket and the other for anchor bolts. Columns to be strapped together as shown on drawings provided.

The shell portion of heater to be tested to 200 lbs. hydraulic pressure and tubes to 150 lbs.

(Continued in next issue.)

Showing a section of the shower-bath room.

Not only is this heater to be used for exhaust steam but live steam can also be utilized, which is governed by a reducing pressure valve, as well as by a small by-pass one inch in diameter.

The heater is also fitted with what is known as a floating heat which is necessary to take care of expansion and contraction the water heater under thermostatic control. The latter is of the floating head type and is heated by live steam which passes through a reducing valve, or it can be by-passed.

Live Steam Heater

In addition to the low pressure or exhaust steam heater, a live steam heater is also provided for two purposes. In case repairs have to be made to the first named heater or when the power plant is not in operation, and all live steam is to be used for heating the building.

It might be as well to give the specifications by which this heater was governed and which appeared in Section 16 of the heating specifications.

"Furnish and erect in connection with hot water heating system one live steam heater 14 ft. 8 in. long over all, and 48 inches diameter inside of shell. The heater is to be composed of three (3) parts cast iron inlet chamber, steel shell, and cast iron outlet chamber, shell to be 5-16 inch steel plate, seams double butt strapped triple riveted, with angle iron riveted to each end for bolting to tube plates and flange of chambers.

VALVE HAND BOOK.

The Chapman Valve Manufacturing Co., Indian Orchard, Mass., are issuing a very interesting and useful pocket edition of their new catalogue, which describes fully their line of valves.

Their Canadian representatives are The Canadian Sarco Engineering Co., Toronto and Winnipeg, from whom a copy may be obtained upon application.

AND THE WHOLE CRAFT WILL BE LOOKING FORWARD TO SEEING SOMETHING DONE ON THE OCCASION OF THIS IMPORTANT EVENT.

THE SANITARY ENGINEER

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JUNE 1, 1916

THE COMING CONVENTIONS

THE summer weather is at last with some of us in this big country, and Canada is a big country. It is doubtful whether we ever really realize its vastness. And when convention time comes along, we do not always realize the long distance and the time involved by many who are in attendance at these important events.

Conventions! What are they held for? What do the members of a society hope to accomplish by meeting each other at such gatherings? Simply this, they hope to bring about better conditions, better relations between one and another.

The Canadian Society of Domestic, Sanitary and Heating Engineers will, on June 19 to 22 inclusive, hold their twenty-first convention. The society reaches its majority this year, let us hope to see a goodly number present, all filled with the "Come let us reason together Spirit" and without doubt, a successful convention will be realized. London, Ontario, is the city, and Foresters' Hall, the building in which the meetings are to be held.

COST OF DOING BUSINESS

"IF you, Mr. Editor, could in some way or other make every person starting in business on their own account, realize that they are assuming a responsibility first in the shape of overhead expenditure, before profits could be realized, you would make life worth living for hundreds now engaged in the business."

Such were the words of a salesmanager on one of our largest supply houses.

The facts no doubt are that a great number of men think if they can become a boss, the profits will soon come automatically. Life is too short to gamble it away in assuming responsibilities which have not first been looked full in the face.

There can be no profits until overhead expenses have been provided for. In fact, most overhead expenses are paid, while the very goods are not paid for, to say nothing of the profit. The man who has not made some provisions to cover his cost of doing business, and receives credit is nine times out of ten going to have a very short business career. The one thing which is more needed than anything else by many engaged in the plumbing and heating business, is a thorough business training. These men are splendid mechanics, honest and intend most of them to pay their way; but the responsibility assumed is too great.

IF I WERE A PLUMBER

"I WOULD install an inspection service. For a modest monthly fee I would inspect all faucets, stoves, heating plants, and bathroom fixtures, my fee to cover such clearly specified items as cleaning stoves and furnaces at stated intervals, but not the replacement of worn parts or repairs.

"I would base my fee on cost. The intimate knowledge of prospects' needs which I would gain by this service would enable me to add many customers, no doubt, and naturally they would give me preference when they found that repairs were needed.

"I would specialize on the properties of non-resident owners of renting properties, pointing out to them the truth of the old proverb that 'A stitch in time saves nine.' And I would advertise as my slogan, 'A contented tenant saves agent's fees.'"

That's what Wesley K. Lester said in April issue of "System." Now, Mr. Sanitary Engineer, what are you going to do to make yourself more valuable to those who dwell in your city?

Sanitary and heating engineers are not given the credit which is their due, by any means, but what is

being done to improve matters? Mr. Lester, no doubt has struck a very important note, and one worthy of some thought. But there is something else which could be added to Mr. Lesters' suggestion.

How many of our men are as tidy and clean as they could be?

How many come to the shop with clean boots? There is more in these trivial matters than one may think at first, let us analyze this thought.

A man makes his appearance at the door of a customer, he is neat and clean, has cultivated neat habits, when he enters a bathroom he takes up the mat, asks for a few newspapers, makes as little dirt as possible, instructs the apprentice to keep greasy hands off the wall paper or fixtures, and leaves the house clean. What kind of treatment would such a man be given? The writer is speaking from experience, and knows full well that small things such as those mentioned means a lot to a customer.

Let us go one further. Why not try and prevail upon the men in our employ to wear a white or clean colored uniform? Our men have to enter the very best rooms of a house. Why not be clean and tidy?

No man has to go through almost every room as has the sanitary and heating engineer, and there is no reason why he cannot be tidy.

The question may be raised. What about cleaning a dirty furnace? That's all right. Why not have a suit of overalls to put over this white or clean covered uniform, or take off the clean suit and put on overalls?

It just means this, an untidy looking man and apprentice can never demand the same respect, or create as good an impression as one who has a clean, tidy, appearance.

Therefore, besides all the things which Mr. Lester would do if he were a plumber, I would do my best to create a good first impression, by being clean and tidy in appearance.

SEWAGE DISPOSAL PLANTS

A BOOK recently issued by the conservation commission entitled, "Water Works and Sewerage Systems," discloses some very interesting details, not altogether of a creditable nature to the municipalities or even provincial bodies.

Of 295 towns and cities in the Dominion, we find that only 75 treat their sewage before it enters some public waters, either lakes, rivers or streams, 204 of these municipalities actually allow raw sewage to pollute, because pollute, it must, in flowing into such open waters. The wonder is that the health of the people is as good as it is, though this fact is no excuse.

Just imagine, out of a total value in public sewers, of 74½ millions of dollars, only about 3¼ million dollars have been spent in an endeavor to purify the sewage.

Out of nine provinces only six have some of their towns and cities equipped with disposal plants. Ontario has spent more in this connection than all the rest of Canada put together. The following are the various amounts expended on sewage disposal systems.

Ontario, $1,774,287; Saskatchewan, $694,485; Quebec, $389,000; Alberta, $131,300; Manitoba. $116,291; British Columbia, $113,572.

These statements would almost appear to prove that THE SANITARY ENGINEER is right when we maintain that there is a great need for a Federal Department of Health, composed of men who could assist those municipalities in solving their sewage disposal problems, and in insisting that no Canadian waters or earth be polluted with sewage.

WHAT ARE PUBLIC COMFORT STATIONS?

PUBLIC comfort stations are buildings provided with water closets, lavatories, drinking fountains and other sanitary toilet accessories, and, whenever space permits, rest rooms. They may be in the crowded business sections and in the parks; or, where economy of space demands, in the city squares or grounds fronting public buildings, below the surface of the streets, though in the opinion of THE SANITARY ENGINEER, suitable locations can be found in most towns and cities where comfort stations can be erected on the street level.

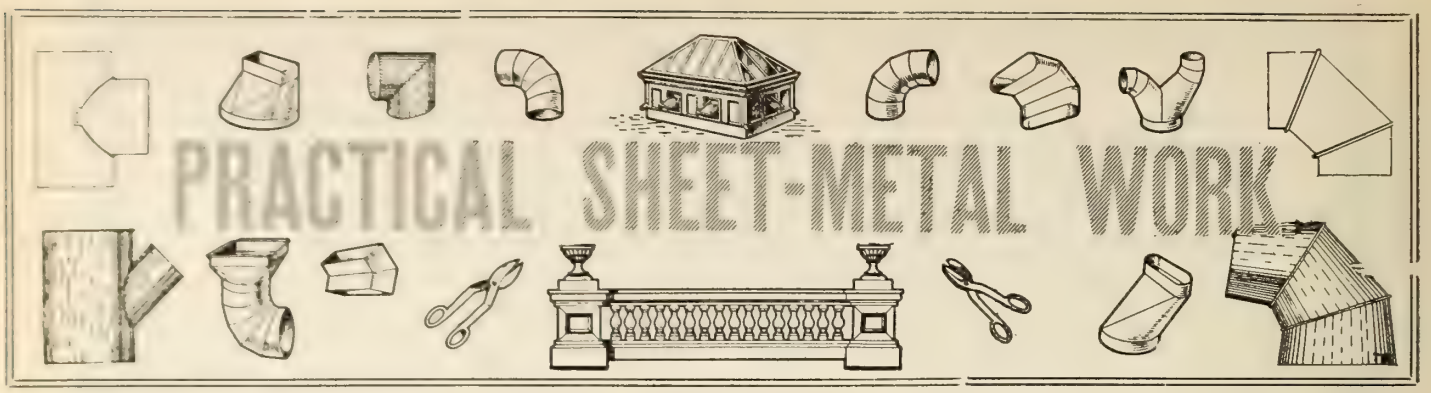
If there are any comfort stations which do not appear to be utilized as readily as they should be, it will be found that they are those which are built underground.

Not only should these buildings be fitted up with all manner of lavatory and bathing accommodation, but also with rest rooms, places of shelter, etc., and no doubt if these latter accommodations were furnished, the general public would not fail to take full advantage of them.

COLLECT FACTS REGARDING TRADE

WITH the object of assembling and collating information bearing upon the new trade situation created by the war, the Ottawa Government has appointed a war trade committee. The new committee, which has been created by order-in-Council, is to be purely inter-departmental and will consist of Sir Joseph Pope, Under-Secretary of State for External Affairs; John McDougald, C.M.G., Commissioner of Customs; F. C. T. O'Hara, Deputy Minister of Trade and Commerce, and one other, the committee having power to enlist the co-operation of certain other officials. Trade conditions as they exist now and as they will probably be at the conclusion of the war will be dealt with in the light of information collected by the War Trade Committee.

THE DATES ARE JUNE 19, 20, 21 AND 22, SO DON'T FAIL TO BE ON HAND. IT'S UP TO YOU TO SEE IT THROUGH.



By CHARLES SEIVERS

IN this issue is shown a flared article, round at top, square at bottom, but with the base at an angle to the top, as shown in side elevation.

Draw plan, as shown by A B C D, placing plan of top in centre, as shown by circle. Divide the plan of top into four sections, having the diameter drawn from the division parallel to the sides of base as described at 1 9 to A B. From each of these points draw lines to corner (see A B C D). From each of the divisions in the circle draw lines to the nearest corner, as between 1 5 to A and 5 9 to G, repeating same on the other two sections. The lines thus obtained form the bases of angles; the height of the angles at A and D is the straight height on elevation. From A to D, as shown by line E A, with E D as an altitude, and the different points A 1 to A 5 as bases form the angles shown at X A 1, thus obtaining the points X 1, X 2, etc., to X 5. The height of angles at B and C is equal to straight height between B C on elevation, as shown by B F, with B F as altitude and the points B 5 to B 9 as bases form the angles shown at X B 5.

To lay out pattern, draw a line equal to D A on elevation, as shown by E 1. With E as a centre and E A of plan as a radius, then draw an arc. And with X 1 at angle A as radius and point 1 of pattern as a centre draw an arc intersecting the one drawn from E, thus obtaining point A.

With point A as a centre and the different points X 2, X 3, X 4, and X 5 at angles A as radii draw arcs intersecting each, as drawn with arc drawn from last point obtained, as from point 1, to obtain point 2, 2 to 3, etc., the radius of the arc being one division of circle in plan. When point 5 is obtained, draw lines joining A 5, with A as a centre and A B on elevation. As a radius, note that A B on elevation shows correct length A B, but on plan it does not; draw an arc. With X 5 at angles at B as a radius and point 5 as a centre draw an arc intersecting the one drawn from A obtaining point B.

Now draw lines, joining A B and B 5. With B as a centre and the different points, X 5, X 7, X 8, X 9, as radii, draw arcs intersecting each as drawn, with arc drawn from last obtained point, the radius being equal to one division of circle in plan. When point 9 is obtained, draw a line joining B 9 with B as a centre, and B C on plan as a radius draw an arc. With X 9 at B as a radius and point 9 on pattern as a centre, draw

(Continued on page 31.)

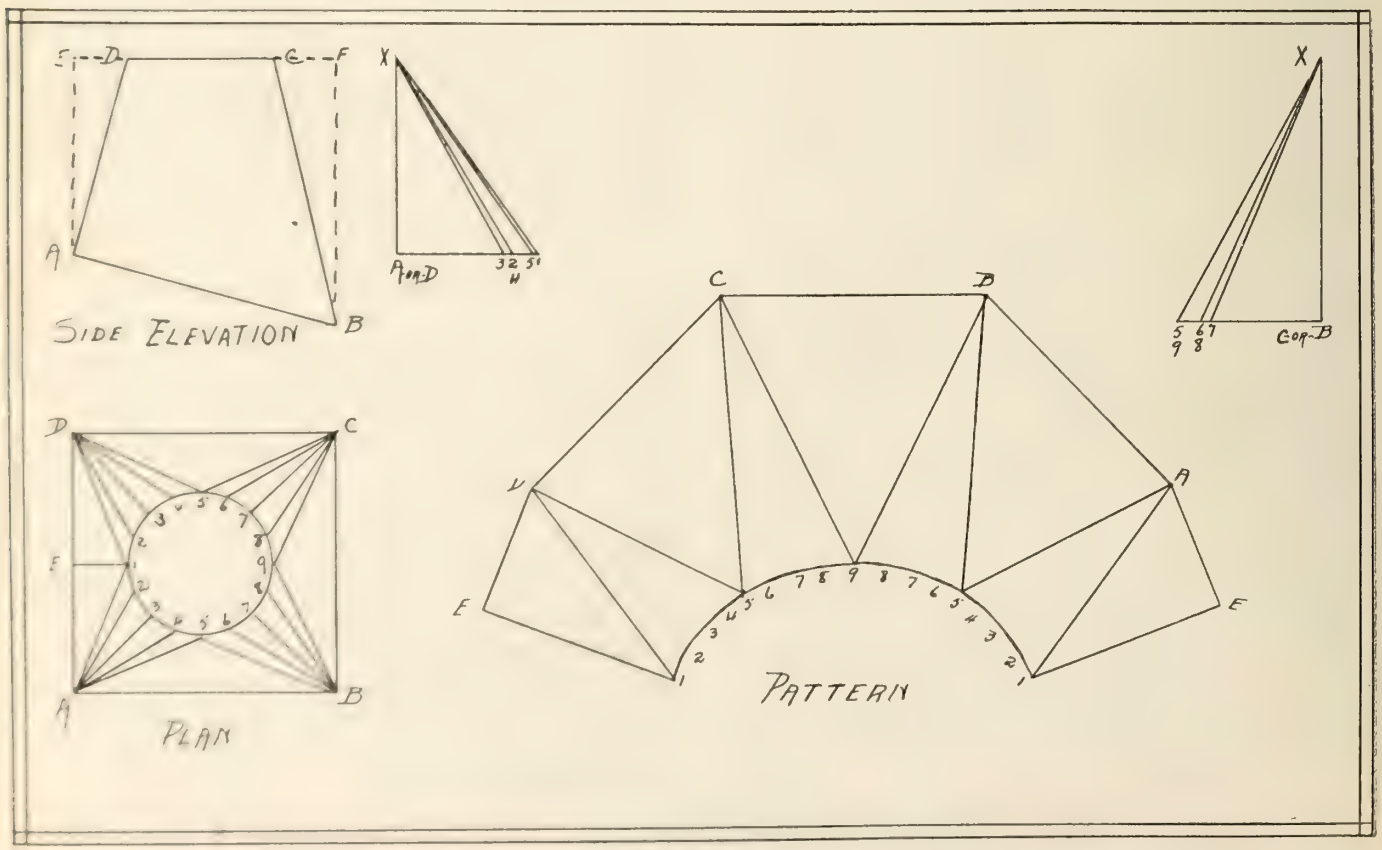


PLATE 36

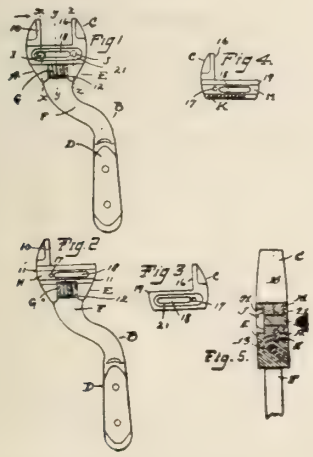
New Canadian Patents

No. 166,282.

H. D. Smith & Company assignee of William Stratton Thomson, both of Plantsville, Conneticut, U.S.A., 30th November, 1915; 6 years. Filed 7th September, 1915. Receipt No. 255,-676.

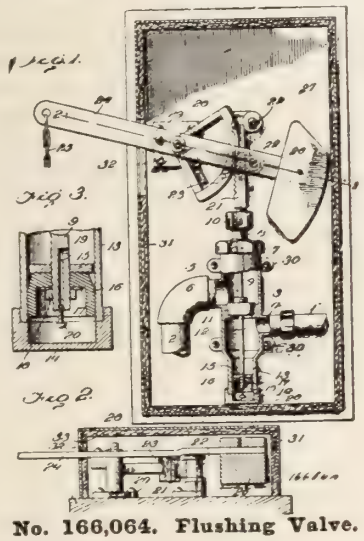
Claim.—1. In a wrench comprising a handle member having a jaw, a way, and a worm having its thread portion projecting into the said way, a jaw member having a jaw and a guide arm fitting the said way, and a rack suitable for engaging with the said worm, means for holding the said arm engaged with said way and worm comprising a pair of pins fixedly attached one to each of the said members and the pin in one member passing through a slot in the other member having its head engaged with the outer face of the said other member.

2. A wrench comprising a handle member having a way and a jaw at one end thereof, ond a jaw member having an arm provided with a way and a jaw at one end thereof, one of the said ways having a rib and the other of the said ways having a groove fitting the said rib and engaged therewith, the said rib and groove being of appreciable width, and means provided on the said members for holding the said groove engaged with the said rib and comprising holding pins and the said pins passing through the said rib and groove.



No. 166,282. Wrench.

3. A wrench comprising a fixed member having a jaw, a movable member having a aw, the said fixed member having a head provided with an open way extending across one face thereof, and also having a worm, the said movable member fitting in the said way and having a rack, a rib positioned in the said way and the said arm having a groove fitting the said rib, means for holding the said arm in position in the said way and with the said rib engaged with the said groove, and the said means being divided and arranged as a pair, with one of the parts thereof on each side of the general axial line of the wrench.



No. 166,064. Flushing Valve.

4. In a wrench having a handle member comprising a body portion and an axially extending jaw and a jaw member having an axially extending jaw and a transversely extending arm, the said body portion and arm provided with co-operative ways and with moving means for holding the said ways in engagement comprising a pin on each of the said members, and means for co-operating with the said pin provided on each mating member.

5. In a wrench comprising a handle member and a jaw member operatively connected, and having a rib on one member and a groove on the other member fitting and engaged therewith, the said members provided with slots in registration extending along the said rib and groove, and a guide pin fixed in each of the said members, having the body portion passing through the slot in the other member and the head engaged with the said other member.

No. 166,064.

Alexander Feleki, New York City, New York, U.S.A., 16th November, 1915; 6 years. Filed 25th May, 1915. Receipt No. 252,105.

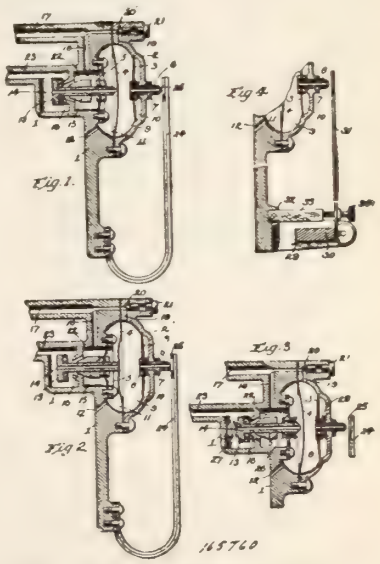
Claim.—1. In a device for the purpose set forth, the combination of a casing having an inlet and an outlet, a piston rod extending through the upper end of the casing, a valve carried by said rod and adapted to seat within the casing between the inlet and the outlet, means external to the casing and acting upon the piston rod to raise and lower the valve, and means carried by the piston rod below the valve to retard the seating movement of the same.

2. In a device for the purpose set forth, the combination of a casing having an inlet and an outlet, a piston rod extending through one end of the casing, a valve carried by said rod and adapted to seat within the casing between the inlet and the outlet, a rack bar rigid with the upper end of the piston rod, a segmental gear meshing with said hack bar, a lever having a fulcrum coincident with the pivot of the said gear and provided at its inner end with a counterbalance and at its outer end with an operating medium.

No. 165,760.

The Johnson Service Company, assignee of Carl F. Johnson, both of Milwaukee, Wisconsin, U.S.A., 2nd November, 1915; 6 years. Filed 4th June, 1915. Receipt No. 252,475.

Claim.—1. The combination of a fluid pressure motor, a source of fluid pressure leading thereto, a vent valve for said motor adapted to be moved by pressure in said motor, and closure for said valve located in line therewith having automatic actuating means responding to changes in atmospheric condition, said valve being adapted to move toward said closure upon a rise of pres-



No. 165,760. Control Device.

sure in said motor, whereby a quick sealing is effected.

2. The combination of a fluid pressure motor, a source of fluid pressure leading thereto, a vent valve for said motor adapted to move under variations of pressure in said motor, and a closure for said valve located in line therewith having automatic actuating means responding to changes in atmospheric condition, said valve being adapted to move away from said closure upon a fall of pressure in said motor whereby a quick venting is secured.

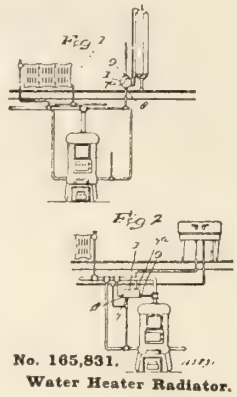
3. The combination of a control mechanism for a motor, a fluid pressure actuated abutment adapted to operate said control mechanism, a source of fluid pressure leading thereto, a vent valve mechanism responsive to changes in atmospheric condition adapted to vent fluid pressure acting on said abutment, and a pressure actuated device subject to the fluid pressure acting on said abutment and adapted to co-act with the vent valve mechanism to close the same upon an initial increase of fluid pressure and to open the same upon an initial decrease of pressure.

4. The combination of a control mechanism for a motor, a fluid actuated abutment adapted to operate said control mechanism, a source of fluid pressure leading thereto, a vent valve mechanism responsive to changes in atmospheric condition adapted to vent fluid pressure acting on said abutment, and a resilient diaphragm subject to the fluid pressure acting on said abutment and adapted upon an initial increase of such pressure to close said vent valve, and upon an initial decrease in said pressure to open said vent valve.

5. The combination of a control mechanism adapted to control the operation of a motor, a fluid pressure actuated abutment adapted to operate said control mechanism, a source of fluid pressure leading thereto, a movable valve member having a port adapted to vent pressure from said abutment, a second movable valve member adapted to co-act with the first movable valve member to control the vent port therein, a responsive element operatively connected to move one valve member in response to variations in atmospheric condition, and a pressure actuated device subject to the pressure acting on said abutment and adapted to co-act with the other valve member to move the same in a closing direction upon an initial increase in such pressure and in an opening direction upon an initial decrease in such pressure.

6. The combination of a control mechanism adapted to control the operation of a motor, a fluid pressure actuated abutment adapted to operate said control mechanism, a source of fluid pressure leading thereto, a movable member having a port adapted to vent pressure from said abutment, a second movable valve member adapted to co-act with the first movable valve member to control the vent port therein, a responsive element operatively connected to move one valve member in response to variations in atmospheric condition, and a resilient diaphragm subject to the pressure acting on said abutment and adapted to co-act with the other valve member to move the same in a closing direction upon an initial increase in such pressure and in an opening direction upon an initial decrease therein.

7. The combination with a control mechanism including a pressure chamber and a source of fluid pressure leading thereto, of a valve member having a sealing face, a responsive element adapted to move said valve member, a vent tube adapted to vent pressure from said chamber and mounted to have a limited movement toward and from said sealing face to close and open said tube, an abutment subject to pressure in said chamber, and connected to said vent tube to move the same toward said sealing face, and resilient means opposing such movement.



No. 165,831. Water Heater Radiator.

8. The combination with a control mechanism including a pressure chamber and a source of fluid pressure leading thereto, of a valve member having a sealing face, a responsive element adapted to move said valve member, a vent tube adapted to vent pressure from said chamber and mounted to have a limited movement toward and from said sealing face to close and open said tube, and a resilient diaphragm connected to said tube subject to the pressure in said chamber and adapted to urge said tube toward said sealing face in opposition to the resiliency of said diaphragm.

9. The combination with a control mechanism including a pressure chamber and a source of fluid pressure leading thereto, a movable valve having a sealing face, a responsive element adapted to move said valve, a vent tube adapted to vent pressure from said chamber and mounted to have a limited movement toward and from said sealing face, and a mechanism subject to pressure in said chamber connected to said vent tube and adapted to move the latter into sealing engagement with said sealing face upon an initial rise of pressure in said chamber, and out of such engagement upon an initial fall of such pressure.

10. A vent valve for a pressure motor control device, comprising a vent tube mounted to have limited longitudinal movement, a responsive element having a sealing face movable under changes of atmospheric condition into and out of sealing relation with the end of said tube, an abutment connected to said tube and subject to the pressure to be vented, urging said tube toward said sealing face, and resilient means acting in opposition to the pressure on said abutment.

ENAMELLED BATHS FOR FRANCE

H.M. Consul at Bordeaux (Mr. A. L. S. Rowley) reports that a local firm of general merchants wishes to secure the exclusive representation for France and the French Colonies of United Kingdom manufacturers of enamelled baths and washstands, brass taps, etc., and steam boilers and radiators for central heating. United Kingdom manufacturers of the goods mentioned and exporters of United Kingdom goods, desirous of appointing agents in Bordeaux, may obtain the name and address of the firm referred to on application to the Commercial Intelligence Branch of the Board of Trade, 73 Basinghall street, London, E.C. In making application the reference number (100) should be quoted.

CHANGE OF NAME

The Canada Pipe and Steel Co., having been engaged in the ammunition business for the past year, operating a machining plant at No. 81 Sterling Road, and a forge plant at No. 28 Atlantic Avenue, find it desirable, with the development of the business, to separate the different branches for the purpose of giving special attention to the manufacture of ammunition; and while there will be no change in the personnel of the company or its management, the directors have decided that the ammunition branch will be carried on under the name of the Cluff Ammunition Co. Head office, 81 Sterling Road, Toronto.

In order that British manufacturers may have an opportunity of familiarizing themselves with German methods of publicity, the Board of Trade have collected over 3,000 specimen catalogues of German origin, and these may be inspected at the Foreign Samples Section of the Commercial Intelligence Branch.

Rural Sanitation

A Continuation of the Sanitary Science Course That Has Been Appearing in the Sanitary Engineer, But Having Particular Reference to the Sanitary Disposal of Household Wastes in Unsewered Districts

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 4

IT was mentioned in the last article that the methods used for disposing of the sewage from homes in rural communities not served by a main sewer are in some cases modifications of methods which have been used on a large scale for cities and towns.

The methods of sewage treatment were shown generally to consist of two stages For small plants the first stage of settling out and liquefying the solids was shown to be generally accomplished by means of the septic tank. Sewage farms or the method of broad irrigation and intermittent sand filters, the "natural" bacterial methods for accomplishing the second stage or purification of the liquid sewage were shown, for large cities, to require too great an area. Modifications of the broad irrigation or intermittent sand filtration methods are, however, suitable for private residences where the area available is relatively large. The method of purifying liquid sewage by bringing it to the soil by open-jointed tile placed a few inches below the surface of the ground has proved very successful in many cases.

To trace the development and use of the septic tank as applied to small plants and of the sub-surface method of purifying sewage will be the object of succeeding articles.

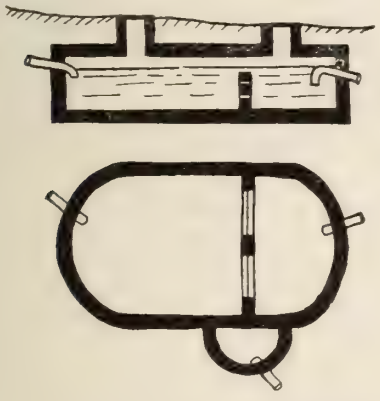


FIG. 10 - State Hospital for the Insane, Worcester, Mass. 1876

The Development of the Septic Tank

Septic is a term used in medicine, meaning the opposite of antiseptic, a term with which everyone is familiar. Antiseptics, as for example, carbolic acid, are used on cuts and wounds of the body to prevent unwelcome bacterial action which sometimes results in fatal blood poisoning. Some years ago treating sewage with chemicals was a fairly common occurrence. When this "antiseptic" treatment of sewage was not found as desirable as had been hoped, the term "septic" was applied to any treatment that allowed of free bacterial action unhindered by the addition of chemicals. It has, however, always been more applied to bacterial action that takes place out of contact with air (anaerobic), and when we speak of a "septic tank," usage has practically restricted the meaning to a tank in which the sewage enters and leaves in such a way that it is not aerated.

The septic tank, as finally patented by Mr. Cameron, of Exeter, England, was preceded in point of time by somewhat similar tanks designed by various inventors. Some of these tanks will be described in this article. To anyone interested in septic tanks these designs illustrate features that may still be used with success in small tanks in which the reader is particularly interested.

The following information is gleaned from a paper entitled "The Antecedents of the Septic Tank," and from other reliable sources.

Fig. 10.—State Hospital for the Insane, Worcester, Mass., 1876

The tank shown in plan and section is from 25 to 30 feet in length. It was designed to settle out the solids from the sewage from 600 persons. It can be seen that the submerged inlet and outlet, usual features of the septic tank, are employed; a diaphragm wall, with punched screens and screen weir, are also features of this tank. The liquid sewage from this settling tank is purified by broad irrigation.

Fig. 11.—Mouras' Automatic Scavenger, Paris, France, 1881

Mouras' Automatic Scavenger is important from the fact that it is very frequently referred in literature on the subject of septic tanks. Mr. Mouras was no doubt one of the first to discover that the solid organic matters of sewage became liquefied in a closed tank. He believed that "the animal dejecta contain within themselves all the principles of fermentation or of dissolution necessary and sufficient to liquefy them, and to render them useful in their return to the soil, without appreciable loss"; it was upon this principle that he based the action of his tank. It was probably not recognized till later that the partial destruction of the solids in such tanks was accomplished by bacterial action and resulted not only in liquefaction, but also in the production of gases. The scavenger was described in the early eighties in the Cosmos des Mondes as being a metal receptacle, hermetically sealed, continuous in working, absolutely inodorous, which rapidly transforms all it receives into a homogeneous fluid, only slightly turbid, free from deposits of any kind, and almost devoid of smell. The size of the tank recommended was such that it had a superficial area of about one square foot per person.

Mouras' scavenger was used for some years in Paris until the passage of the Act requiring the discharge of all sewage direct into the mains without preliminary treatment of any kind.

Professor Rideal has stated that the fact that the flow from such a tank was not sufficiently purified without further nitrification prevented the automatic scavenger from being more generally adopted.

Fig. 12.—Tank Design by Edward S. Philbrick, Boston, Mass., 1883

The object of the tank is apparently to prevent solids getting into the sub-surface irrigation system, which was the method of disposal advocated by Mr. Philbrick for suburban residences. A syphon placed in a separate chamber for ease in looking after it provided for the intermittent application of the sewage to the sub-surface system.

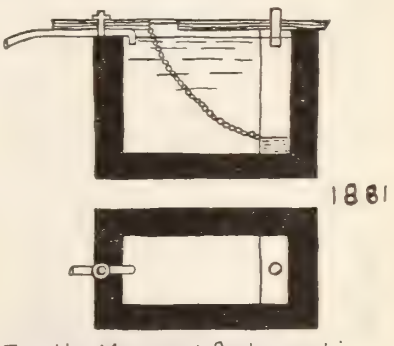


FIG. 11 - Mouras' Automatic Scavenger, Paris, France

It should be noted that in its main features this tank and the sub-surface sys-

tank of disposal are methods now advocated by many writers and extensively used for small plants.

Fig. 13.—The Scott-Moncreiff Cultivation Tank

Mr. Moncreiff commenced investigations and experiments in 1890, and in 1891 actually constructed a tank in which the crude sewage was admitted

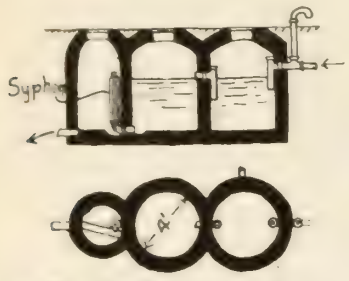


Fig 12 - Tank Design by Edward S. Philbrick, Boston, Mass., 1883

from below and gradually passed upwards over the surface of a bed of stones. The construction of this "cultivation" bed or tank was briefly described in a recent issue of The Sanitary Engineer.

It consisted of a chamber filled with large stones, supported by an iron grating, into a space under which the sewage is admitted, and through which the sewage passes slowly upwards, escaping by an overflow at the top. The stones were furnished for the purpose of affording a resting place for the anaerobic bacteria which acted in a manner to liquefy or break up the solids.

Although possibly different in method, the principle involved is the same as in the septic tank, as the solids are reduced by anaerobic bacterial action.

Fig. 14.—Massachusetts Agricultural College, 1893

A plan and section of the tank are shown as illustrating some features of interest.

Fig. 15.—The Cameron Septic Tank Patented in the United States, 1899

The so-called septic tank was developed by Mr. Cameron, of the City of

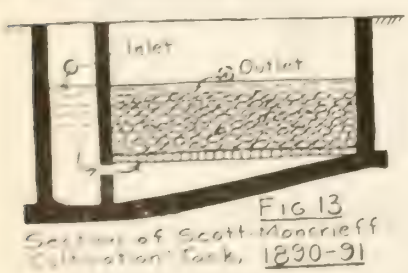


Fig 13
Section of Scott-Moncrieff Cultivation Tank, 1890-91

[illegible] and his associates [illegible] in which [illegible] patent [illegible] claims of which [illegible] ably the more important are Nos. 1, 12 and 21, which are given below:

1. The process of purifying sewage, which consists in subjecting the sewage, under exclusion of air, of light, and of agitation, to the action of anaerobic bacteria until the whole mass of solid organic matter contained therein becomes liquefied, and then subjecting the liquid effluent to air and light.

12. In an apparatus for purifying sewage, the combination of a septic tank, an inlet occupying the greater part of the width of said tank, and an outlet extending across the greater part of the width of the tank and disposed above the bottom of the tank and below the normal water-level thereof, said outlet comprising a pipe having a longitudinal slot therein extending the greater part of its length.

21. The process of liquefying the solid matter contained in sewage, which consists in secluding a pool of sewage having a non-disturbing inflow and outflow from light and agitation until a thick scum is formed on the surface thereof and a mass of micro-organisms has been developed of a character and quantity sufficient to liquefy the solid matter of the flowing sewage, the inflow serving to sustain the micro-organisms, and then

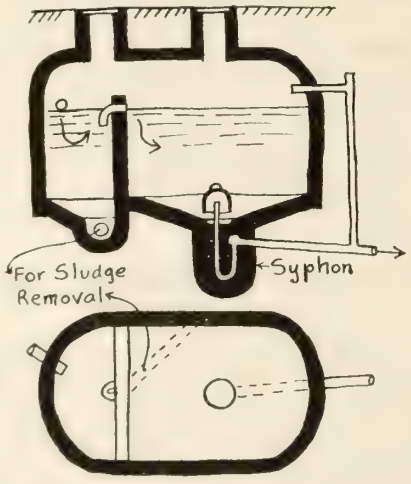


Fig 14 Massachusetts Agricultural College 1893

subjecting said pool, under the cover of said scum and under the non-disturbing inflow and outflow, to the liquefying action of the so cultivated micro-organisms until the solid matter contained in the flowing sewage is dissolved.

It will be noted that the claims of the Cameron patent are very broad, and a septic tank could hardly be constructed and operated without infringing on this patent. As far as the writer knows there has never been any question raised over the construction and operation of small tanks for residences; but the owners of the Cameron patent in the United States became involved in litigation in an endeavor to collect royalties from the village of Saratoga Springs, New York. In 1907 a decision was rendered by the courts that was unfavorable to the Cameron patent. Upon appeal, a decision more favorable to the Cameron Company was granted. From the records in this Saratoga case it is generally understood that if the sediment or sludge

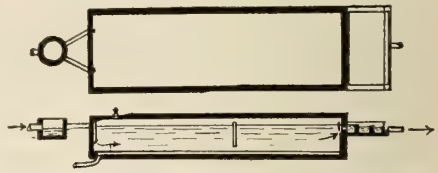


Fig 15 - The Cameron "Septic Tank" as patented in the United States, October 3rd, 1899

is removed from a tank every six weeks or less it is technically not a septic tank, but a plain sedimentation tank, and no action could be successfully taken by the Cameron Company for infringement of patent. The Cameron Company are reported to state that this viewpoint is not of general application.

In the next article the advantages and disadvantages of the septic tank, what it was expected to accomplish, and what it has actually accomplished, will be reviewed.

(Continued in next issue.)

SOME THINGS WE HEAR

Joe Brown and a certain member of the trade were discussing the advisability of using a price list sheet in making out an estimate.

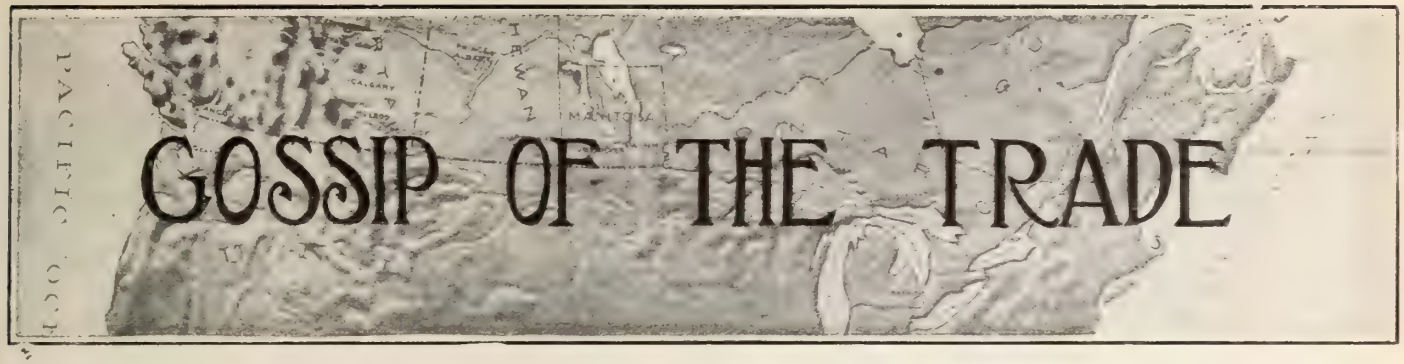
The sheet enumerated every item of goods so that it would be next to impossible to miss out anything necessary to complete an ordinary plumbing installation.

Brown's friend declared that he had used a number of such sheets and found that it was impossible to omit even the smallest item. "But" said he, "I simply had to cut out using the sheet." "Why"? asked friend Brown. "Well, you see" he replied "if I ever submitted a tender based upon the results I got from using one of these sheets I seldom if ever got the job, because of the fact that the figures worked out too high."

The sequel to this story which is an actual fact, is that in about 14 months after the conversation referred to Brown's friend was out of business.

THE GROUCHER.

A groucher is very much like the man who does not know on which side his bread is buttered. If he drops his grouch he will soon find out just as he would if he dropped his bread.



GOSSIP OF THE TRADE

PRESENTATION

The employees of the Hamilton branch of Standard Sanitary Company, Jackson street, Hamilton, presented to H. A. Rogers, son of the manager, a wrist watch as a token of regard. The presentation was made by H. M. Luck.

ESTABLISHING IN CANADA

The Waldon Company, with offices at Winnipeg, Montreal and Toronto, are now manufacturing their Spencer boilers at Penetanguishene, Ont. Heretofore these boilers were made in the United States. The company's business has grown to such an extent that it has been deemed necessary to establish a Canadian plant.

NOTE-ORIOUS PERSONS

The man who uses a gallon of words in his endeavor to express a spoonful of thought, is a time waster, and time is more valuable than life. Time brings life, time belongs to every person but himself.

Most editors and journalists are mere jugglers of words. They can, if they wish, use the spoonful of words, but, like many non-progressive plumbers, they fear the job would be done too soon.

The man who can call a spade a spade right off his bat has a future before him.

KILLED IN ACTION

When Lieut. Trafford Jones was killed in action recently, those with whom he had been in contact experienced no small shock. Mr. Jones was in the employ of the Jas. Robertson Co., Toronto, for about two years. He was the inventor of a number of patents: one of particular interest to the trade being the cone radiator trap, in the manufacture and installation of which he was engaged at the time he joined for service overseas.

Mr. Jones first joined as a member of the Canadian Army Service Corps, but upon arriving in England took up aviation with such success that he was soon actively engaged. It was during an aerial battle that poor Jones was shot through the head.

No young man seemed to have a more promising outlook than had Trafford Jones. He was one of those men who, while knowing his business, was very unassuming about it. He possessed a clean cut character.

The heating business has no doubt lost in him a man of unusual inventive qualities.

He leaves a wife and one child to mourn him.

The Sanitary Engineer joins with those of his friends in expressing its heartfelt sympathy with the bereaved ones.

CONGRATULATIONS IN ORDER

One of the most important events in the history of the trade took place on Empire Day, at least as far as our esteemed friend L. L. Anthes is concerned, by the fact that he became the proud father of a fine daughter upon that day. We feel sure that every reader of The Sanitary Engineer who has met or has heard of Mr. Anthes will join us in wishing his good lady and himself our heartfelt congratulations. We are pleased to say that all are well and progressing favorably.

SANITARY ENGINEER CONTRIBUTOR ENLISTED

One of the contributors to The Sanitary Engineer has enlisted for service overseas, in the person of Wm. Fairley, the late plumbing inspector at St. Boniface, Man.

Mr. Fairley contributed several articles of interest to The Sanitary Engineer, which proved that he was a progressive worker in the interest of true sanitation. He is a deep thinker, and no doubt will not fail to do his bit towards stamping out the evils of warfare. We sincerely join all his friends in wishing him a safe return.

FLOWING WELL FOUND AT NEW CAMP BORDEN

Col. Low, in charge of the construction of the new Camp Borden, reports the discovery of a flowing well, giving 10,000 gallons per minute at the new camp area. This solves the problem of the water supply at Camp Borden. It is estimated that 200,000 persons can now be supplied with water at the new camp. Work is progressing satisfactorily, and the camp will be ready in two weeks.

THE TRADE PAPER

A good trade paper fills a highly important niche in journalism. Not only does it carry the news of the trade, but bears serious relation to the industry itself. In many industries it wields a greater power than any single house in that industry. It operates not only as an effective means by which manufacturers can talk to the trade about their products, but it also acts as a stimulant to higher ideals of business, and keeps down the abuses simply by turning the light on them. There is no question at all about the importance of trade papers when they have a business policy that is beyond suspicion.

SECURED U.S. CONTRACTS

One of the most aggressive sanitary and heating concerns in Canada to date, is without doubt that of the Drake-Avery Co., Hamilton.

This concern has been successful in securing some splendid contracts. One of the largest in Canada being the Toronton branch of the Ford building, in which the Drake-Avery Co. installed a large forced hot water heating system. As a proof of the good working and satisfaction given by this installation, the Ford Company have entrusted the Drake-Avery Co. with two more large installations, one in the new Ford service building, Chicago, and another in St. Louis, U.S.A.

Still another U.S. constract has been awarded this very progressive concern by J. B. Booker, Junr., Detroit. This contract consists of the plumbing, heating, ventilation, vacuum cleaning, water cooling, etc., and all other appliances which will make the big 14-storey office building, one of the most up-to-date buildings in the United States.

The amount of money involved in this contract amounts to approximately $70,000.

It is with no small degree of satisfaction that our Hamilton subscribers to The Sanitary Engineer have procured such a splendid amount of business, particularly when business is not what might be termed rosy, though a great improvement no doubt is being felt all along the line.

TORONTO SOCIETY NEWS

At a meeting of the executive held last week the following members of the Toronto Society of Domestic Sanitary and Heating Engineers were appointed delegates to attend the Fifth Annual Convention of the Ontario Society of Domestic Sanitary and Heating Engineers.

L. Legrow, F. R. Maxwell, H. Hicks, Wm. Mansell and Geo. Clapperton.

Quite a number of other members have intimated that they will swell the party.

The train leaves Union Station, C.P.R. 8 a.m. Monday June 19th, calling at Guelph Junction at 9.20 a.m. for other members of the Ontario society who expect to be present. The place of meeting and other particulars appear in this issue.

Acceptable Donation

The Toronto Society are acquiring a number of valuable books with a view to establishing a technical library, and in this connection were recipients of a splendid donation by The Standard Sanitary Mfg. Co. The donation comprised 9 volumes on modern sanitation by J. J. Cosgrove.

Those who have the good fortune to peruse these volumes from time to time cannot fail to reap much benefit from the technical information contained in them. Mr. Cosgrove is looked upon as being one of the most practical authors on practical sanitary science, and the Sanitary Engineer congratulates the Toronto society upon having such a splendid work of reference in its possession.

Base Ball Club News

The officers of the Toronto Base Ball Club have made arrangements for games to be played during the season at Dufferin Park.

There may be minor changes from time to time which will no doubt occur. Notice of same will however be given.

The Club are indebted to Thomas Harris, Esq., Superintendent of Dufferin Park for the use of the grounds on the following dates, which fall on Wednesday afternoon of each week during the season.

Date	Place	Playing Teams
June 7	Dufferin Park	West End versus East End
June 14	"	Sanitary Engineers versus Heating Engineers
June 21	"	Regents versus Yankees
June 27	Buffalo Trip	Buffalo Society versus Toronto Local
July 5	Dufferin Park	
July 12	"	Dates and grounds secured. Games to be arranged and members notified at later date.
July 19	"	
July 26	"	
Aug. 2	"	
Aug. 9	"	

Everybody welcome. Come and enjoy the fun.

The Ontario Convention

THE Fifth Annual Convention of the Ontario Society of Domestic Sanitary and Heating Engineers will be held in the Foresters' Hall, Imperial Bank Buildings, Richmond and King Streets, London, Monday and Tuesday, June 19 and 20, 1916.

Directors

President, E. H. Russell; vice-president, Jas. R. Haslett; treasurer, A. E. Gibbons, all of London; secretary, G. F. Frankland, 1093 Bathurst Street, Toronto.

Honorary Directors

E. Lewis Legrow, F. R. Maxwell, Harry Hicks, Wm. Mansell, and George Clapperton.

Reception Committee

Chairman—B. Noble, London.

Secretary—J. Eggett, London.

Thos. Rich, H. Aked, C. F. Needham, and E. Holland, all of London.

PROGRAMME

Monday, June 19th, 1916

First Day

9.30 A.M. Morning Session. Meeting of the Board of Directors and Executive Committee

Afternoon Session

1.30 P.M. Enrolment.
2.30 P.M. Opening Address by Mayor of London.
Reception of members.
2.45 P.M. Roll call.
3.00 P.M. Appointment of Special Committee.
3.15 P.M. Receiving of Reports from Board of Directors and Chairmen of Committees.
4.15 P.M. Resolutions and General Discussions.
6.30 P.M. Members of the Society will be guests of the London Committee to dinner at the Tecumseh House.
8.15 P.M. Entertainment of members at the Opera House.

Tuesday, June 20, 1916

Second Day.

9.00 A.M. General business.
11.00 A.M. Election of new Officers and Chairmen of Committees.
12.00. Luncheon as guests of the City of London.
2.00. General business and closing session.
6.00 P.M. Trip to Spring Bank Park, where dinner will be served.

God Save the King.

Change of Date for the Buffalo Trip

It was announced in a previous issue of The Sanitary Engineer that the trip to Buffalo would take place June 28. This date however, has been changed to June 27, and the time arranged as follows.

Boats Leaves

Those who intend taking in this splendid trip will please meet a little before 7.30 a.m. at the wharf of the Niagara Navigation Co., Yonge Street. Tuesday, June 27, 1916. The boat leaves prompt at 7.30 a.m.

Arriving at Lewiston the party will board special cars for Niagara Falls by way of the Gorge Route, then from Niagara Falls to Edgewater by special cars on the International Railway Co. to Edgewater wharf. From which special boats will convey the party to edgewater Park on Grand Island.

Return Fare, Adults from Toronto to Edgewater $2.00; children, $1.40. Return fare to Niagara Falls for adults, $1.50; children, $1.00. Tickets and further particulars may be procured from Secretary Frankland, 22 College St., Toronto.

Newly Elected Members

At the regular monthly meeting of the Toronto Society of sanitary and heating engineers the following men were elected members of the society, George Trickey, W. G. Cameron, S. H. Adamson.

It is encouraging to note that the Toronto society have recently elected quite a number of new members which speaks well for the society generally.

Montreal Trust Company Takes Over the Standard Ideal Co., Port Hope.

The business of the Standard Ideal Company is now being carried on by the Montreal Trust Company as trustees for the bondholders. This company is said to be the second largest producer of cast

iron, porcelain, enamel sanitary ware in the world, and is the largest of its kind under the British flag. Its factories are located in Port Hope. At the crest of the recent boom it is understood very large additions to the plant were made, and these have not been worked to full capacity in the last year or two, and it is assumed to this over-expenditure of capital that it has been found necessary for the bondholders to take action. H. T. Bush was manager of the undertaking, and was also connected with the foundation of the company as a promoter. A. D. MacArthur, at one time Toronto representative, has been appointed by the Trust Co. to assume control on their behalf.

PRACTICAL COURSE FOR SHEET METAL WORKERS.

(Continued from page 24)

an arc intersecting the one drawn from B, thus obtaining point C.

Next draw lines joining B C and C 9, with C on pattern as a centre and the different points, X 9, X 8, X 7, X 6, and X 5, as radii. Then draw arcs intersecting each as drawn, with arc drawn from last obtained point, this arc having a radius equal to one division in circle on plan. When point 5 is obtained, draw a line joining 5 C, with point C as a centre, and B A on elevation as a radius, draw an arc; with X 5 at angle A as a radius and with point 5 as a radius, draw an arc intersecting one drawn from C, obtaining point D; then draw lines joining C D and D 5. With D as a centre, and the different points, X5, X 4, X 3, X 2, and X 1, as radii, draw arcs intersecting each as drawn with arc drawn from last obtained points, the radius of this arc being one division of circle on plan. When point 1 is obtained, draw a line joining D 1. With D as a centre and D E on plan as a radius, draw an arc. With point 1 as a centre and A D of elevation as a radius, draw an arc intersecting the one drawn from D, obtaining point E. Draw lines joining D E and E 1, thus completing outline of pattern as 1 E, D C, B A 1.

The Science of Salesmanship

"YOU can not sell plumbing and heating goods just now, the building trade does not warrant it, and you know as well as I do, that to expect a traveller to book orders now is altogether ridiculous."

That't the way a certain plumbing supply man talked to me the other day. He simply got up in the air when I said that the traveller who could not earn his salary these days should not expect to draw it. Of course, reader, you will note that I said "earn", that does not necessarily mean taking orders; though I will guarantee that the traveller, salesman or whatever you may call him, will do a great deal better if he will change his frontal attack when calling on a prospective customer.

Here's about the average manner in which a traveller calls upon a plumber:

"Good morning, How are you finding business these days?"

"Nothing doing. No building going on, have not had a decent job for months", and a lot more hard luck stuff.

The traveller oftener than not remarks that it's the same story all along the line. "By jove" says he, I'm getting about sick of calling round. There's certainly nothing doing, etc., etc." Now the fact is this all travellers or salesmen are more or less like the fruit gatherer, or the reaper, and if there is no crop of fruit, or grain there will be no need for reapers.

But why are there no crops to garner in? Why are there no orders? Simply because the sowing stopped. The tilling of the ground was given a set back, and until there is more tilling of the soil, more land broken up and more sowing done, there will be no reaping.

If the salesman is sure there is no reaping, no orders to be gotten, then why is he not breaking up the ground? Why is he not preparing for a crop? Why is he not sowing? That's the way to earn one's salary these days.

The salesman of to-day has to be a good all round man, he must be able to break up and till the soil as well as reap, and if he reaps and has not at some period sown, then he's reaping what he has not sown and the credit is not his.

But, I think I hear some one say, "Oh yes that may be true, but where's a fellow to sow these days? Where's the ground to break up?"

It is right in the mind of the prospective buyer.

Just to illustrate my point. In the depth of last winter a certain house owner had too small a furnace in his home, he and his family were all suffering from colds as a result of the house not being well heated.

A heating engineer was called in, and he declared that a heat generator was all that was required. He did not note the size of furnace, or amount of radiation and thus find out exactly what it would be best to do. The generator was put on, and a little improvement was felt; but an extra cold spell came along and things were as bad as ever. What was the real trouble? The furnace was exactly 30 per cent. too small for the amount of radiation it was required to heat. Now, here was good ground to do some sowing. That heating engineer was a poor salesman and the salesman calling upon him regularly should have talked "Creating Sales" getting after new business, giving extra service, etc.

If there is one thing more than another which sanitary and heating engineers lack, it is "the science of salesmanship."

The manufacturer or jobber's salesman can "earn" his salary if he will study sales plans and pass them on to the prospective buyer.

To cite another case not very many weeks ago a fairly good sized residence was to be built, a number of supply men's travellers called upon one of the sanitary engineers to tender on the material "according to the specifications" and did.

Now, everybody knows that if there's one thing more than another which will be "skinned" it will be the plumbing and heating, in spite of the fact that it is the most important part of the whole building, and should not be "skinned" at all, rather the reverse. But there seems to be a something akin to fear of an architect, no one or at least very few sanitary engineers or even salesmen would ever dare to suggest any higher grade of goods, new patterns, or, say, a shower or a heat regulator, or heating themostatically controlled. All these things would be "too expensive." If the architect did not specify such modern appliances.

Not a bit of it. It is simply a matter of education, of tilling the ground. People have more money in Canada than ever before which if properly interpreted means that the ground is more fertile, and richer, but it wants breaking up. It wants tilling or you can't expect to reap, and never will. The secret of successful salesmanship is to first show your prospect what he will lose by not buying. In other words you show him how he can sell the goods which you want to sell him. But you must show him how to sell and in that way he will realize that he is playing a losing game by not buying. Therefore if a salesman cannot pluck the fruit — book the orders—he can prepare the soil, plant the seed and in that way earn his salary. That is the true science of salesmanship.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

How Is It That a Heat Generator Causes Higher Temperature of Water?

Editor, The Sanitary Engineer.—While I am well aware that a heat generator is nothing more nor less than a something which increases the pressure on a hot water system, I can't figure out how the additional pressure causes increased temperature.

Can you tell me how this increased temperature is brought about?

H. W. G.

The above question has puzzled many a person, and hundreds of householders have wondered what the simple addition of an appliance to a pipe, either near the expansion tank or furnace, can have to do with generating more heat. The fact of the matter is no such thing really happens. There is no such thing as a heat generator in existence except the source at which fuel is consumed or transmitted from one body to another. In a house where a hot water furnace is installed and fuel of any kind is consumed [illegible]

This statement, of course, is a true [illegible] Heat generators are warm air furnaces, hot water furnaces, steam furnaces and boilers, whether electricity, natural or artificial gas, coal, coke, wood, peat, or any other kind of fuel be used to create or generate heat in water or air.

Then there are gas generators of various kinds, [illegible] electric current generators, which latter are [illegible]

However, the appliance commonly [illegible] and engineering field can still be termed a heat generator so long as those engaged in the trade thoroughly understand what the term means when speaking of such an appliance.

Now, the question still in our mind is, what does really take place when a heat generator is placed on the line of expansion? Water at sea level boils at 212 degrees Fah. atmospheric pressure. That means that if a person took a pot of water near the seaside on a level with the sea and applied heat so as to bring the water to boiling point, the temperature of the water would be 212 degrees Fah. But if a person were to go up to some high altitude, say, on the top of a mountain 1,000 feet above sea level, the temperature of boiling water would only be 210 degrees. In round figures there is an approximate loss of heat degrees in boiling water of 2 degrees to every 1,000 feet above sea level. It will, therefore, be seen that there is a less atmospheric pressure being exerted upon the surface of water the higher we go.

At sea level this pressure is 14.7, or 14 7-10 lbs., per square inch; and if we were to travel down into a pit shaft, say, 1,000 feet below sea level, the atmospheric pressure would increase.

Now, suppose instead of going up to a high level in our endeavor to make water boil at less than 212 degrees, we required to relieve the weight of atmospheric pressure, 14 7-10 lbs. per square inch, how would we do it? By simply closing the vessel in which the water was to be boiled, and creating a vacuum in some way or other, the most simple method being the employment of a small vacuum pump, and, according to the amount of vacuum, the temperature of the water at boiling point would be determined.

Water under a vacuum will boil at 98 degrees—that is, the water would boil and appear to be boiling, just as actively as water in an open vessel, but the temperature would only be 98 degrees.

Therefore, such being the case, if we add weight to the already existing atmospheric pressure, 14 7-10 lbs., we are bound to increase the boiling point of the water, simply because the resistance is increased.

In a hot water heating system there must be provision furnished for easy expansion of water, and if the furnace is placed at sea level the water will boil at 212. Now, place a weight upon the open end and the expansion of the water has to not only overcome the atmospheric pressure, but also the added weight.

Next, in a hot water system there is not only expansion to be considered, but also contraction, and this contraction is just as important a matter to consider as is the expansion, and whatever generator or other means which may be employed to raise the temperature of water at boiling point, simple yet absolute means must be provided to ensure ease of contraction.

Concluding, it will be seen that by the application of appliances or apparatus, known to the heating trade as heat generators, constructed with a view of exerting a higher atmospheric pressure upon water, thus raising the boiling point of water, a heating system can be made to give off a higher degree of heat than if the water in the system be left open and subjected to merely atmospheric pressure.

At the same time, reliable provision must be made for contraction, which, of course, is brought about by water becoming cooler.—Editor.

"Hydraulic" Flush Valve

SIMPLE IN CONSTRUCTION
POSITIVE IN OPERATION

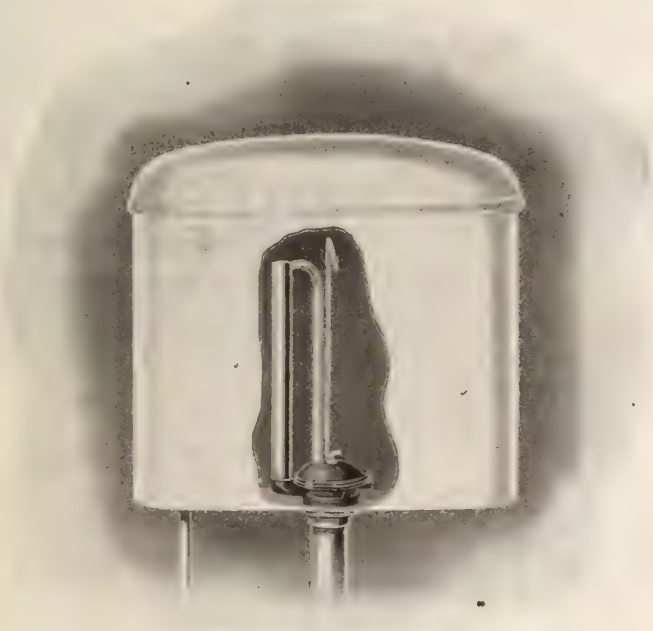
No rubber washers to get out of order,

No wearing parts to loosen up.

Will drain more water out of tank than any other make of flush valve.

Can be made to work automatically.

Made of the best Red Bronze, and unconditionally guaranteed.



The illustration on left shows how the "Hydraulic" Flush Valve is installed in the Enameled "Armco" or any other Tank. The simplicity of the action of the "Hydraulic" is apparent to observers of ordinary perception. Once you know the "Hydraulic" Flush Valve the chances are 100 to 1 that you will use them exclusively.

Insist that the tanks you buy be equipped with them.

Install them on your repair jobs and make everlasting friends of your customers.

H. Mueller Manufacturing Company, Limited

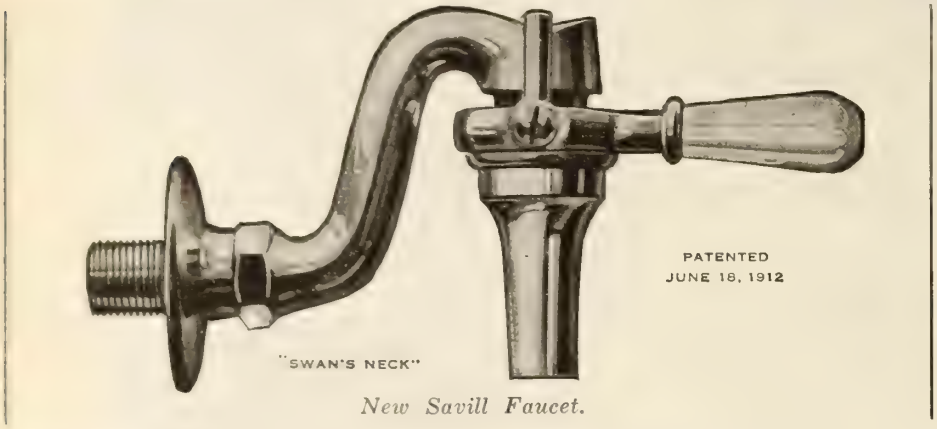
SARNIA, ONTARIO

MAKERS OF HIGH-GRADE WATER, PLUMBING AND GAS BRASS GOODS

New Sanitary and Heating Goods

NEW COMPRESSION FAUCET

A new type of compression work is being placed on the market by the Vici Radiator Co., John Street N., Hamilton.

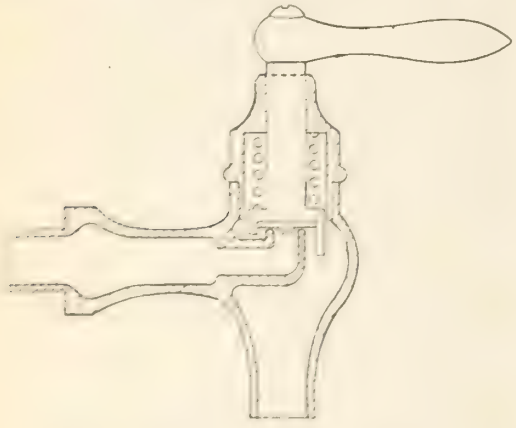


New Savill Faucet.

There are a number of very commendable features claimed for this type of faucet which will be known as the Savill line of compression. It is certainly simple in construction. Full particulars as to prices, discounts and descriptive literature, etc., may be procured upon writing to the above address

NEW FAUCET AND RELIEF VALVE

In many hot water supply systems the expansion of the water creates undue pressure on the range boiler and pipes, and trouble is frequently experienced by range boilers, not actually bursting, but rather springing leaks, which trouble would be obviated if the extra pressure had some natural safety outlet. By the use of the new stack relief valve, it is claimed that not only can these troubles be overcome, but that the valve can also be used as a faucet. Full particulars may be obtained from the manufacturers, the Slack Heater Mfg. Co., Boston, N.Y.



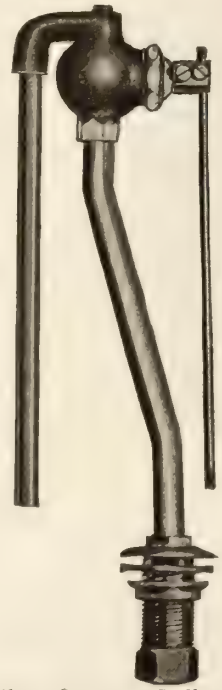
Stack Faucet and Relieve Valve.

NEW SILENT BALL COCK

One of the newest lines to be introduced to the trade is that of a new silent ball cock for w.c. tanks. It is made in several tyles, so as to be adapted to the various types of tanks, both high and low.

Its construction is very similar to the new Quaturn line of basin cocks. All parts are easy of access and interchangeable.

Full particulars can be obtained by writing to the manufacturers, the Wallaceburg Brass and Iron Manufacturing Co., Wallaceburg, Ontario.

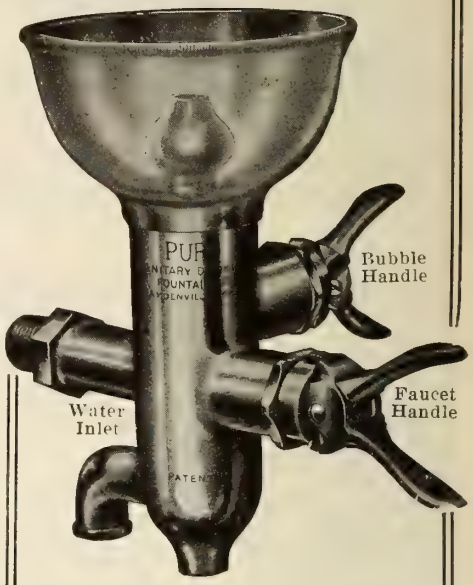


Silent Quaturn Ballcock.

PURO
(MADE IN CANADA)

Saves Dollars

Why let that old-fashioned faucet go on year after year wasting water—MONEY?
Why more drinking cups and glasses, only to become unsanitary—lost, broken or carried away? Puro Sanitary Drinking Fountain stops all this needless waste. Puro saves you 35% on the water bill alone. Puro saves you all that money you spend for cups. YET Puro is always ready with a clear, cool drink with dollars in the bank.



Puro Pays for Itself

You don't have to wait years to get back the small investment you have tied up in Puro equipment—
You start cashing in at once—not only on your water bill saving, but on the increased efficiency of your workers as well.
Men like PURO—it's clean. No danger of deadly germs lurking in its sparkling bubble.
Write us—tell how many men, how many departments, and we'll tell you how much the cost will be to

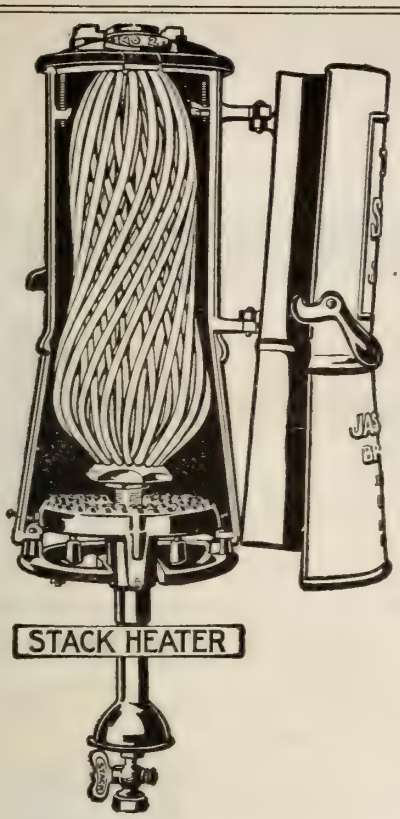
"PURO-FY"

YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company
147 University Ave., Toronto, Canada

Advertising

"Advertising is the education of the public as to who you are, where you are, and what you have to offer in the way of skill, talent or commodity. The only man who should not advertise is the man who has nothing to offer the world in the way of commodity or service."—*Elbert Hubbard.*



STACK FACTS

From Recent Tests Made by Various Gas Light Companies

There were 18 different Heaters tested under practical conditions, the conditions being the same for each Heater.

The STACK proved the best in every test.
The STACK heated the water quickest.
The STACK heated the water hottest.
The STACK heated the most water.
The STACK showed the highest efficiency.

James Morrison Brass Mfg. Co., Limited

93-97 Adelaide Street West, TORONTO

Our Mixed Metal Sales Amount to Over $5,000,000 Annually

We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

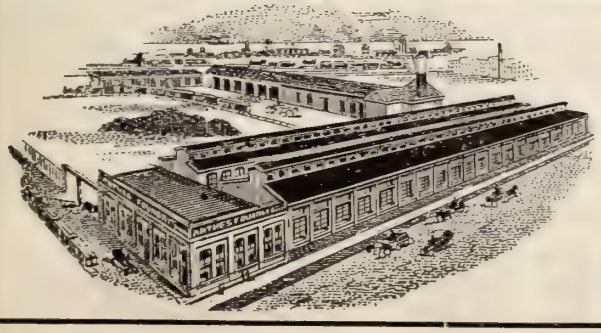
Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO

New York, N. Y.; London, Eng.; St. Louis, Mo.

TORONTO **ANTHES FOUNDRY LIMITED** WINNIPEG



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CAST IRON SOIL PIPE AND FITTINGS

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Horses and Beef

A British authority outlines the future of Horse Breeding.

Bell, the rising Ontario authority, talks of Baby Beef.

Junior Farmers — the New Profits.

Are You Building?

—The New Canadian Farm House
—Essentials of a Good Barn
—Building New or Remodelling
—Installing a Farm Water System
—Canadian Irrigation
—Heating a Farm Home
—Saving Hand Power in House and Barn
—Lightning Protection
—Dawson's Drainage Scheme
—Bill Jones' Power Plant

All these are subjects in the June issue of

THE
FARMER'S MAGAZINE

the live, up-to-date farm monthly that is making farming profitable and more pleasurable.

Besides, you want to read:

Breeds of Chickens
Poultry Article

The Significance of the Unseen
Dairy Article

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Woodsworth

How the Canny Scot Gets $75,000,000 for Farm Loans
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The Girl and Her Vocation
Miss Guest

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Genevieve

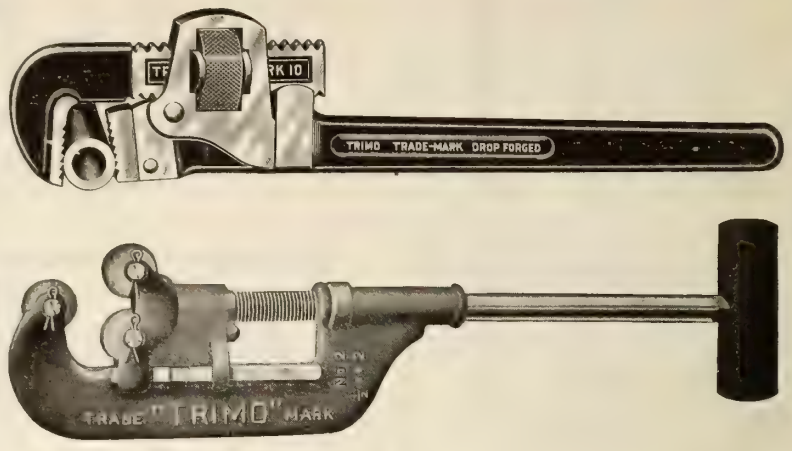
"Farm Isolation" Bogey
Dr. Backus

Get *The Farmer's* habit and have this magazine come regularly to your desk by mail. Only one dollar a year, and it is the brightest, best illustrated dollar's worth in America. Only 10 cents a copy. A big Bird story in July. Write

The
FARMER'S MAGAZINE
142-153 University Ave, TORONTO

World-Famed Specimens of the Age of Steel

TRIMO



TOOLS

Send for Catalog No. 91

MADE BY

TRIMONT MFG. CO., 55 Amory Street, Roxbury, Mass., U.S.A.

Agnes C. Laut

In "Give America the Whole Truth," startles us with revelation after revelation of Germany's dirty work in the United States and Mexico—to breed strife, make America her vassal, gain a friend at the peace conference, inspire and muzzle the public press, interfere with the manufacture of munitions, and in other ways make America her dupe and fool. Miss Laut writes out of inside knowledge. She amazes us with her access to hidden things. "Give the facts to the public," she concludes, "the American voter will do the rest."

Miss Laut is a Canadian living in New York. Her genius, her vivid, virile style, her intimate acquaintance with those in high places, her mental breadth—these and other qualifications make publishers everywhere keen for her work. It is a veritable triumph for MACLEAN'S to have secured the series of war articles which she is now contributing to this magazine.

Arthur Stringer

Begins in the June number a humorous, whimsical and wholesome romance, "The Anatomy of Love." Never has this versatile Canadian excelled this new story of his. MACLEAN'S is fortunate in securing the first rights to this superlatively good story for Canadians.

Have regard also for these other distinguished Canadian writers whose work appears in the June MACLEAN'S.

Robt. W. Service

provides two poems written at the front — "The Odyssey of 'Erbert 'Iggins" and "The Convalescent."

Arthur E. McFarlane

contributes a mystifying detective story, "Behind the Bolted Door?"—the best detective story since Sherlock Holmes.

Alan Sullivan

supplies a timely sketch, "The Romance of Cobalt" —a sketch of the camp, past, present and future.

MACLEAN'S

MAGAZINE is getting the best Canadian writers to put their best work into articles and stories of particular Canadian interest. This is a deliberate policy on the part of MACLEAN'S publishers. Other Canadian writers of note whose work appears in MacLean's are:

Stephen Leacock — Nellie McClung — Arnot Craick
L. M. Montgomery — H. F. Gadsby — Robert E. Pinkerton

Not the least appreciated feature of MACLEAN'S is its popular Review of Reviews Department, which condenses for busy readers the cream of the world's best periodical literature.

MACLEAN'S MAGAZINE maintains a clean and wholesome tone. Its advertising pages are censored to exclude all objectionable advertising. MACLEAN'S can be taken into your home without any hesitancy, to be read by any member of your family.

JUNE NUMBER AT ALL NEWS STANDS 15c

WROUGHT PIPE

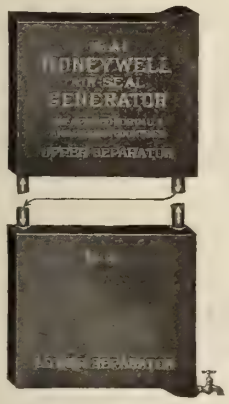
BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED
Montreal Works: Lachine Canal

The Honeywell Air-Seal Generator



Generates and maintains a predetermined pressure without the use of springs, valves, weights or mechanical parts.

Made entirely of cast iron and will last indefinitely.

Easy to connect and requires no attention after installing.

Write for complete catalog—it describes in detail the construction and operation of this simple and inexpensive pressure-creating device.

The Honeywell Heating Specialties Co.
Wabash, Indiana

Consulting Sanitary Engineer

Advice and Plans on
Water Supply and Sewage Disposal for Residences, Factories, etc.

H. L. SEYMOUR, B. A. Sc.,
A. M. Can. Soc. C. E.

BOX 95, SANITARY ENGINEER TORONTO

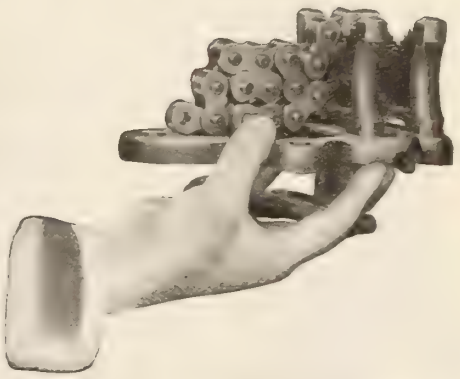
R. O. Wynne-Roberts

Consulting Sanitary Engineer

310 TEMPLE BUILDING, BAY STREET
TORONTO

Water Supply, Sewerage, Sewage Disposal of Cities, Villages and Institutions.

Since It's Only a Handful



3 sizes. Capacities ⅛ to 8 in. pipe

Williams' "VULCAN" Chain Pipe Vise

Why leave it behind?

Before you return you may need to turn a thread, make a bend, cut off an end or perform any of the other ordinary operations for which a plumber is usually summoned.

Better go *prepared* and clinch a life-long customer on your first visit.

J. H. WILLIAMS & CO.
77 RICHARDS STREET BROOKLYN, N.Y. CITY
THE WRENCH PEOPLE

Western Office and Warehouse :
40 SO. CLINTON STREET CHICAGO, ILL.

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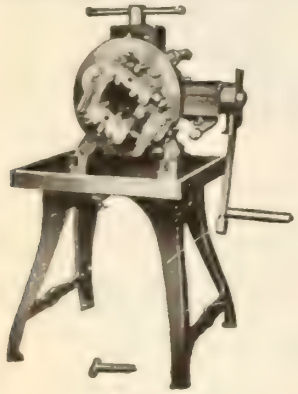


No. 00

PIPE MACHINES

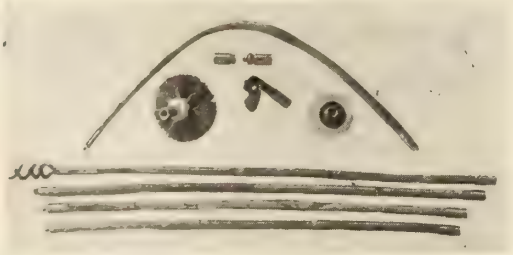
Either Hand or Power

This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
A time and labor saving machine.

Manufactured by

THE ARMSTRONG MFG. CO.
317 Knowlton Street
BRIDGEPORT, CONN.
WRITE FOR CATALOGUE

DRAIN CLEANING MACHINE
As supplied to His Majesty's Government.



Every Plumber Should Use
"ROGERS MALACCA DRAIN RODS"
Fitted with Scraper, Brush, Screw and Plunger
ROGERS AGENCIES, 84 Victoria St., Toronto

Want Ads.

There is someone who is looking for just such a proposition as you have to offer. For two cents a word you can speak across the continent with a condensed advertisement in this paper.

TRY IT OUT.

FORGETTING

One of the things we all do well is to **forget.**

Names that were household words yesterday are gone to-day.

Because people knew your Name and your Line a year ago it is no sign they do to-day. They forget easily.

Keep yourself in the public mind by advertising. It is just as important to make old friends remember as it is to win new friends. Advertising does both.

Classified Buyers Guide

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Air Line Systems.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Air Valves.
Canadian Wolverine Co., Ltd., Chatham.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
Jenkins Bros., Ltd., Montreal.
Kerr Engine Co., Ltd., Walkerville.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Asbestos Goods.
James Morrison Brass Mfg. Co., Toronto.

Boilers, Steam or Hot Water.
Lord & Burnham Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Boiler Feed Regulators.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Brass Goods, Valves, etc.
Canadian Wolverine Co., Ltd., Chatham.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Jenkins Bros., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Brass Pipe and Tube.
Canada Metal Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Bubblers.
Canada Metal Co., Ltd., Toronto.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.

Cellar Drainers.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Chain Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Closets.
Amherst Foundry Co., Amherst, N.S.
B. O. T. Manufacturing Co., Toronto.
Canada Metal Co., Ltd., Toronto.
Cluff Mfg. Co., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Consulting Engineers.
H. L. Seymour.
R. O. Wynne-Roberts, Toronto.

Country Residence Equipments.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Limited, Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Damper Regulators.
W. E. Clark & Co., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Drainage Fittings.
Canada Metal Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.
West Toronto Foundry Co., West Toronto.

Drinking Fountains.
Canada Metal Co., Ltd., Toronto.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.

Ejectors, Steam.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville.

Ejectors for Sewage.
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Enamelware.
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Canada Metal Co., Ltd., Toronto.
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Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.
Standard Ideal Mfg. Co., Ltd., Port Hope.

Electric Pumping Machinery.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Faucets.
Canada Metal Co., Ltd., Toronto.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.

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James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
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Canada Metal Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Floor and Ceiling Plates.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
Canada Metal Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
James Morrison Brass Mfg. Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

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Hoyt Metal Co., Toronto.
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Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.

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W. E. Clark & Co., Ltd., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

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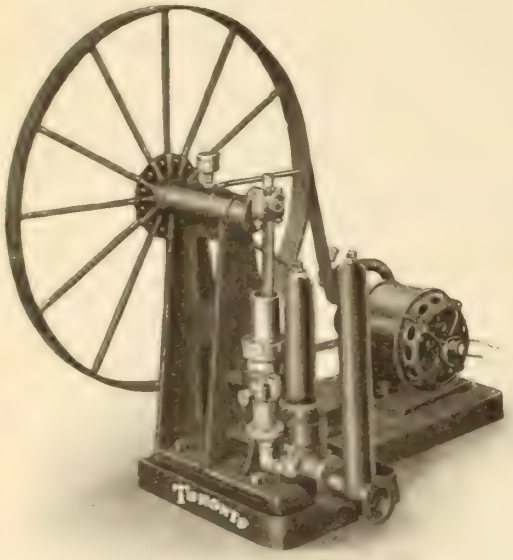
Do You Install Water Systems?

Being a plumber no doubt you do and we venture to say that that particular branch of your business, if properly developed, will be the most profitable. To be successful you must do your work well and must also install material that is as nearly perfect as possible, otherwise your reputation would soon be very bad, and no matter how hard you worked or how much you advertised you would soon find yourself without any business.

Keep Your Standard of Work High



TYPE "S" Pump showing Air Injector and Suction and Discharge Air Chambers.

TORONTO
DOMESTIC
WATER SYSTEMS

Are the latest and most up-to-date as well as being the most efficient water systems on the Canadian market. A Toronto Water System properly installed will be an advertisement that will do your business more good than all the advertising you can do in any paper.

Write us to-day for full information of these excellent Systems.

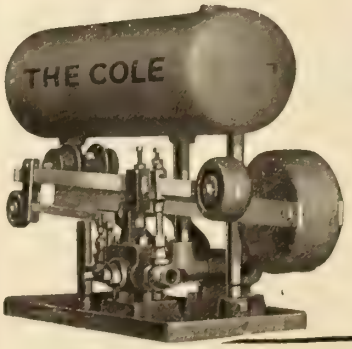
Ontario Wind Engine & Pump Co.
LIMITED
Toronto, Ontario

DARLINGS STEAM APPLIANCES

DARLING BROTHERS
LIMITED
Engineers and Manufacturers
MONTREAL, CANADA

Branches: Toronto and Winnipeg
Agents: Halifax, St. John, Calgary, Vancouver

COLE DIRECT RETURN TRAPS



Are big fuel savers because they operate on 1-10th the steam that it takes to run a steam pump.

They work with the utmost in efficiency and reliability, and return condensation at any pressure.

Operate on roller bearings, on a fixed Fulcrum which permits of full discharge at each operation.

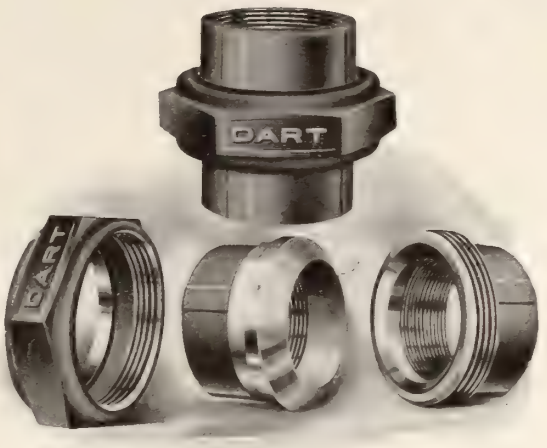
Mr. Steamfitter, why not get in touch with US?

GEO. W. COLE CO.
838 Dundas St., TORONTO

You can talk across the continent for two cents per word with a WANT AD. in this paper.

DART

—UNIONS—



Bronze to Bronze
at the joint
—No deterioration

Heavy Iron Parts
—No stretching or pulling apart

Easily Connected
—whether pipes are in or out of line

Satisfied customers are a sure result of using Dart Unions, because the Dart's Efficiency is practically everlasting.

Positively guaranteed.

SOLD BY ALL JOBBERS.

Manufactured by
DART UNION CO., Limited
Toronto, Canada

MADE IN CANADA

Kerr Radiator Valves and Union Elbows

for Steam and Hot Water Heating Systems, possess the proper staying qualities. They are not only up to the minute in appearance, but are there with the quality under the polish and nickel. If you have been in the Heating business any length of time, you should be familiar with Kerr valves.

WORKS AT WALKERVILLE, ONT.

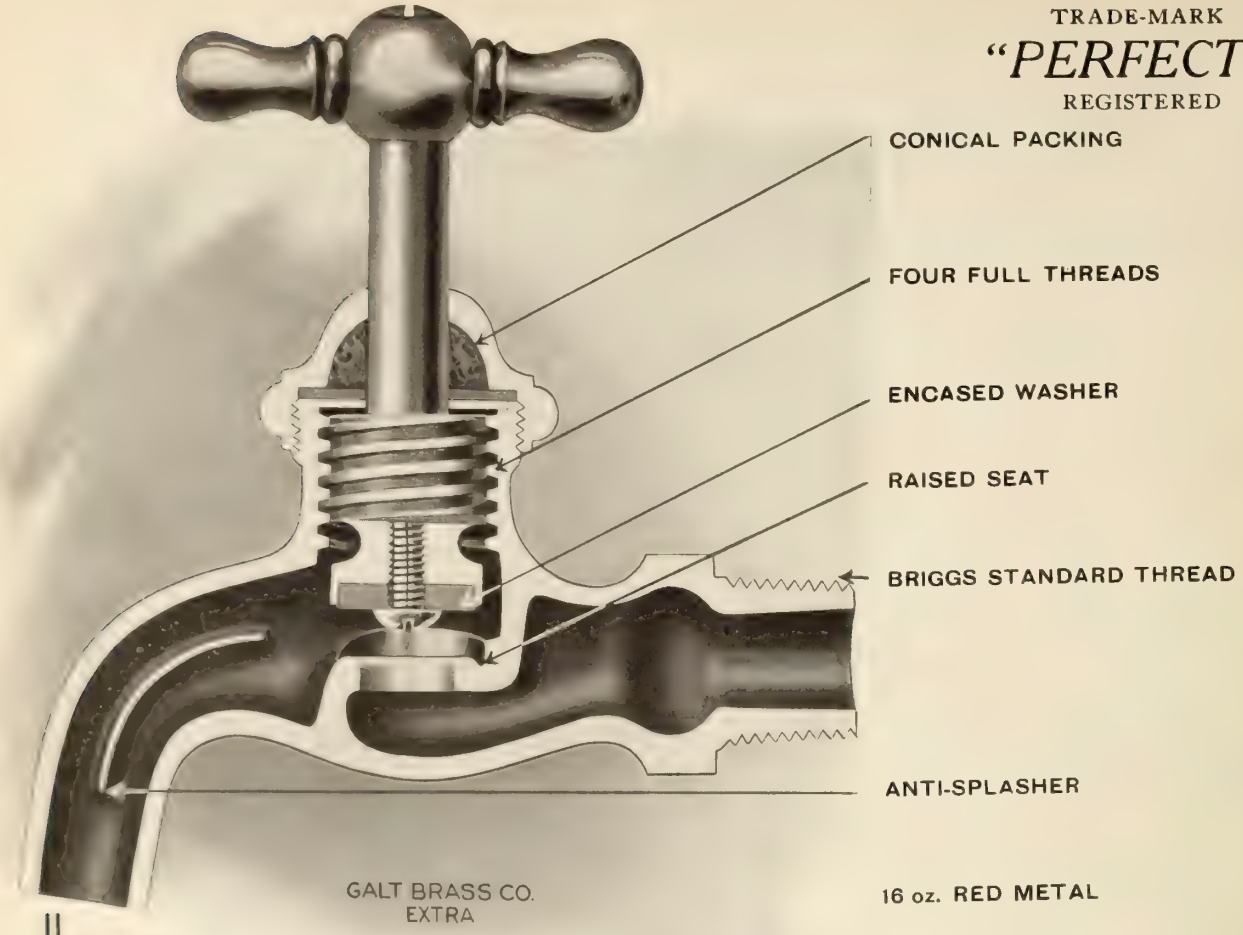
If you are new at the game, we invite you to "get wise" to this line of valves. Our catalogue No. 5, is yours for the asking.

You don't experiment when you buy Kerr valves.

We paid for the experiments long ago.

The Kerr Engine Company
Limited
WALKERVILLE, ONTARIO

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

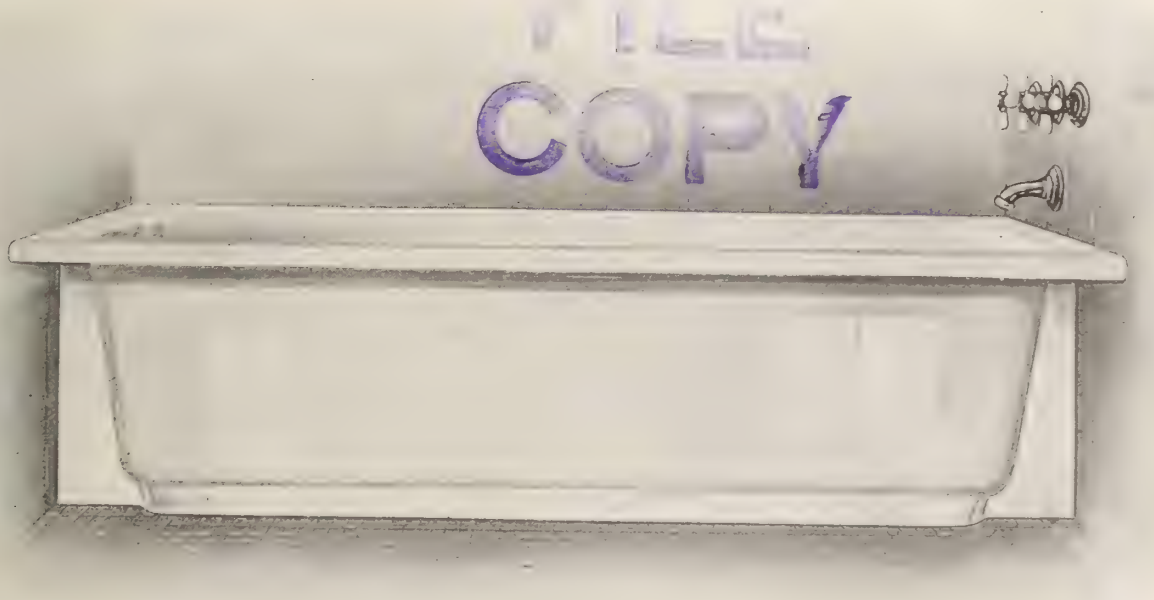
THE MACLEAN PUBLISHING COMPANY, LIMITED PUBLISHERS

Vol X. Publication Office: TORONTO, JUNE 15, 1916 No 12.

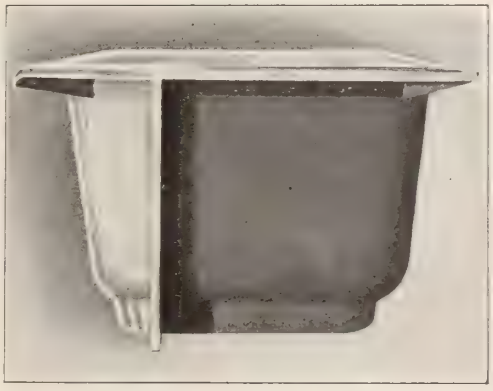
Enameled All-over

VICTOR ONE-PIECE BATH

Enameled Inside



The principle of the Victor Bath is a tub body cast integral with a Base and Wing Plates: the latter in various positions on the Tub Body to make the various Combinations, viz.:



Open Type
Corner Type
Recess Type
End to Wall Type
Back to Wall Type
Also with Extension Rim at End or Back for fittings—thru rim.

PRICES ON REQUEST

The Standard Ideal Company Limited

General Offices and Factories: Port Hope, Canada

TORONTO	MONTREAL	WINNIPEG	VANCOUVER
119 King St. East	42 Beaver Hall Hill	76-82 Lombard St.	203 Crown Building

THE LARGEST EXCLUSIVE CAST IRON ENAMELING SANITARY WORKS UNDER THE BRITISH FLAG.

The Goods You'll Eventually Buy

Based upon a quality, second to none; you make no mistake in starting now to supply your customers with BEAVER BRAND White Enamel Ware

Ask your jobber for BEAVER BRAND CAST IRON ENAMEL WARE
and build up your reputation

EVERY DOLLAR WE OWN STANDS BEHIND THE GOODS WE MAKE

Amherst Foundry Co., Limited

General Offices and Factory: Amherst, Nova Scotia

WRITE YOUR NEAREST AGENCY

AGENCIES:

ONTARIO:
Monarch Brass Mfg. Co., 71 Brown St., Toronto

MANITOBA and NORTHWEST:
E. B. Plewes, 120 Lombard St., Winnipeg

28 "Service" Branches Throughout Canada.

Canadian Consolidated Rubber Co., Limited

MONTREAL, P.Q.

If manufacturing facilities and an up-to-date system of distribution mean anything at all to those in need of Rubber Supplies, then the Dominion Rubber System commends itself to all wide-awake, progressive buyers.

Six factories and twenty-eight "Service" branches at central points throughout Canada, so as to ensure prompt shipment, afford a service that is not equalled in Canada.

Back of all is the warranty that the Dominion Rubber System qualities are absolutely worthy and dependable.

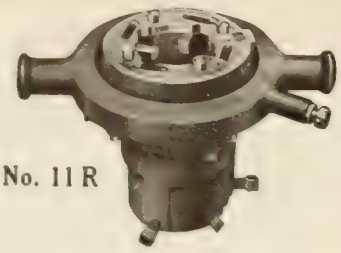
Our constant aim is to serve and please you, no matter what the need in Rubber Goods may be.

Write for catalogue and price list.

Canadian Consolidated Rubber Co., Limited

MONTREAL, P.Q.

28 "Service" Branches Throughout Canada.



No. 11 R

"Jardine" Adjustable Ratchet-Threading Tool

Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely enclosed, excluding chips and dirt.

YOU CAN REDUCE THE LABOR OF PIPE THREADING 50 PER CENT., AND MAKE THREADS AS CLEAN AND PERFECT AS IF CUT ON A LATHE WITH ONLY ONE CUT WITH

"Jardine" and "Toledo" Pipe-Threading Tools

"Jardine" or "Toledo" dies spare the muscle of the man who does the work, and save money for the man who pays the wages, as they enable one man to do the work of two and costs less for repairs. No cams or jimcracks to wear and get out of order. Cutters that cut, don't squeeze. Set of cutters for each size of pipe. Lead screw ensures perfect pitch and form of threads. Adjustable to all variations of fittings, very durable cutters.

All threads finished at one cut. One man does the work of two.

It will pay you to look well into the merits of the "Jardine" and "Toledo" before placing your next order for tools of this kind.

Write for catalog and full particulars.

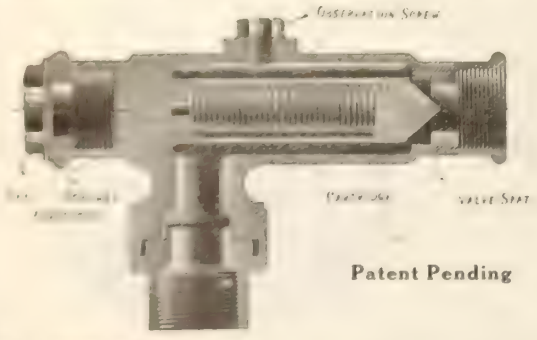
We'll gladly supply the names if you wish to have a chat with users in your town.

MADE IN CANADA

A. B. JARDINE & CO.

HESPELER, ONT.

Sole makers of "Jardine" Pipe-Threading Tools.
Sole licensees to manufacture and sell Toledo Pipe-Threading Tools in Canada.
Agents, Winnipeg and West—Stanley Brock, Ltd., Winnipeg, Man.
Brockville and East—J. R. Devereux, 233 St. James St., Montreal.



Patent Pending

The "WELO" Trap is guaranteed to pass air or water freely, but to shut off against steam.

"WELO" TRAPS

For High and Low Pressure Steam, Vacuum or Vapor Heating.

Made in Canada

BY

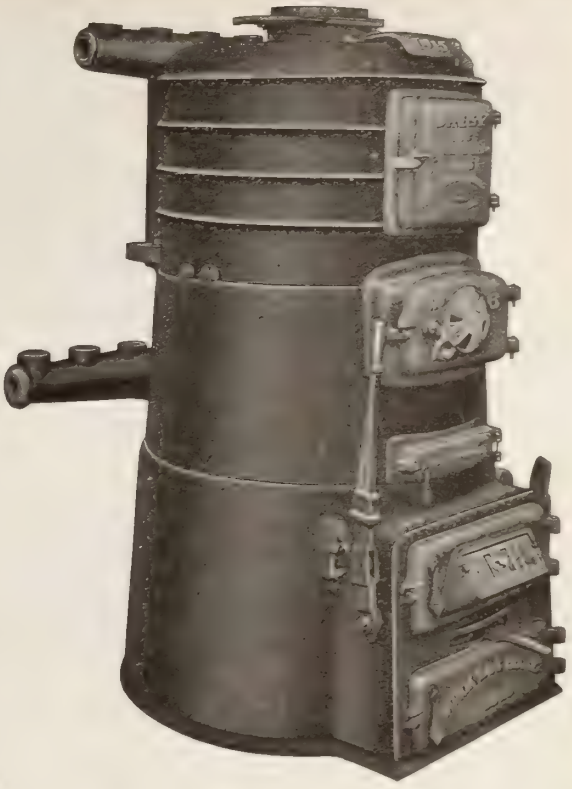
VICI RADIATOR COMPANY

HAMILTON, ONTARIO

When writing advertisers, please mention that you saw their advertisement in the SANITARY ENGINEER."

The Daisy Boiler

The Most Popular Boiler Made



Over 60,000 Daisy Boilers are in use throughout Canada—every one giving entire satisfaction.

Every installation means a satisfied customer.

Minimum consumption of fuel.

Maximum amount of heat.

WARDEN KING, LIMITED, MONTREAL

City Sales Office : 151 Craig Street West, MONTREAL **Branch : 200 Adelaide Street West, TORONTO**

The Fire Pot and Crown Sheet are Separate Sections

IN most boilers, the fire pot and crown sheet are one casting. When this large casting is cracked with careless handling or goes bad because of neglect of the owner, it is costly to replace.

Not so with the Burnham Boiler. Fire pot and crown sheet are separate. The damaged section **only** need be replaced.

Cost of single sections is low. Cost of putting them in is low. It's an economy point that will appeal to your prospective boiler buyer.

This is a Burnham Cosy Comfort Water Boiler with 2 intermediate sections

Below are the five parts of a Burnham Round Water Boiler. Note that the crown sheet section and the intermediate section are reversible. This means that the smoke pipe will always be at the back where it belongs, no matter how many sections are added.

We have been making just such improvements as these in our boiler for over 40 years. We spare no expense or trouble to adopt new patterns that will make the Burnham a better boiler.

Our catalog shows every detail of the Burnham—both round and square. Send for it.

No. 1. The base section with its triangular revolving grates.

No. 2. This is the fire pot section, which sets directly on top of the base.

No. 3. Then comes the crown sheet section with its fluted fire surfaces.

No. 4. On the crown sheet section, the intermediate one is then placed. To make the boiler larger, another one is put on top of it.

No. 5. And then comes the top or dome section.

Lord & Burnham Co.

LIMITED, OF CANADA

(Boiler Department)

Royal Bank Bldg.
TORONTO

Burnham Cosy Comfort Heat

Factory:
ST. CATHARINES, ONT.

OSBORNE HOUSE, ISLE OF WIGHT
FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

ROYAL PALACE OF LA MAGDALENA
SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN

SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

Standard Sanitary Mfg. Co.
Limited

General Offices and Factory: Royce and Lansdowne Aves., Toronto, Ontario

TORONTO STORE
55-59 Richmond Street, West

HAMILTON STORE
20-28 Jackson Street, West

BALMORAL CASTLE
SCOTTISH RESIDENCE OF THE KING AND QUEEN OF ENGLAND

THE QUIRINAL
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ITALY, ROME

BUCKINGHAM PALACE
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ENGLAND, LONDON

PALACE OF THE KING OF THE BELGIANS
BRUSSELS

The New Showroom of

THE CANADA METAL CO., LIMITED

FRASER AVENUE - - TORONTO

Enameled Baths, Lavatories
Sinks, Laundry Tubs

AND

EVERYTHING FOR THE PLUMBER

Catalogue "A" Mailed Free on Request.

THE CANADA METAL CO., LIMITED

MONTREAL ∴ TORONTO ∴ WINNIPEG

JENKINS BROS.'

Type "K"

Iron Body Gate Valves

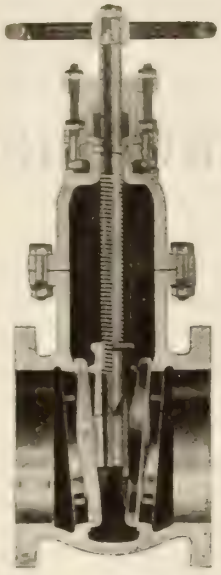


FIG. 402
SECTIONAL VIEW

Suitable for 125 lbs. working steam pressure. Tested to 300 lbs. hydraulic pressure.

These valves are unrivalled in design, material and workmanship. They are neat in appearance, and can safely be used under pressures of steam, water, oil or air. All parts are interchangeable. They are fitted with double, compensating, bronze-faced discs.

Write for Catalogue 8.

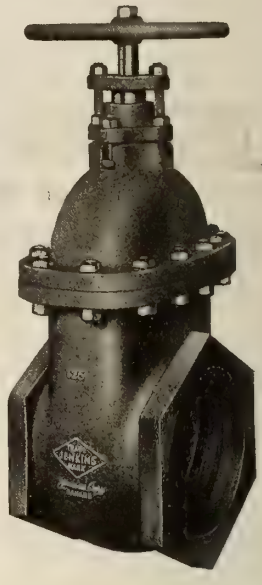


FIG. 401
OUTSIDE VIEW

JENKINS BROS., LIMITED

103 St. Remi Street MONTREAL

STOP THE NUISANCE

of Plugs or Chain and Plugs Coming off Fixtures

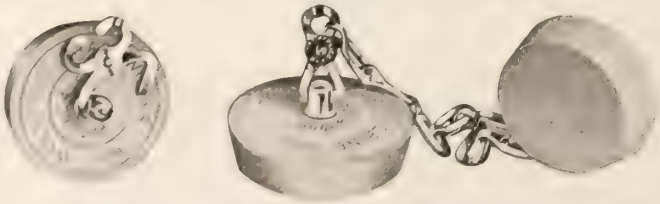
DOUBLE LOCK LINKS

Lock at Top and Bottom
Plug or Chain will not come unfastened.
Easily applied to Fixture.

WOLVERINE RUBBER PLUGS

Made of Extra Quality White Rubber

"DOUBLE LOCK" Links Cannot Pull Away



"DOUBLE LOCK" Links Made in Two Styles

Will not Crack or Crumble in Hot Water.

LET US FILL YOUR NEXT ORDER FOR PLUGS, STOPPERS, ETC.

Canadian Wolverine Co. LIMITED

Manufacturers of Plumbing Specialties, Tool, etc.

Chatham, Ontario

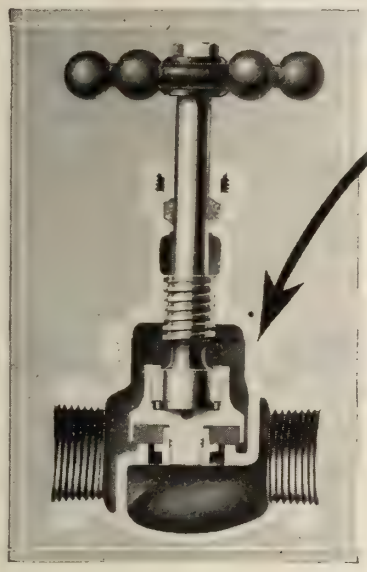
"When writing advertisers please mention that you saw their advertisement in the SANITARY ENGINEER."

TRADE PENBERTHY MARK

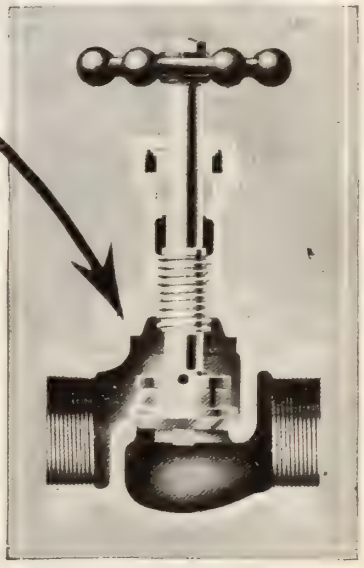
ALL QUALITY BRASS VALVES

COMPODISK
with the Composition Disc

REGRINDING
with the Metal Disc



ALL PENBERTHY VALVES HAVE THE EXTERNAL THREAD CONSTRUCTION



STRONG
Where others are weak.

Outside Thread Construction

Why These Valves Are Superior

1. The connection is non-corrosive because the **threads** (see cut) are on the outside, away from the action of steam and water, making it impossible for them to become limed up and corroded.
2. The connection is stronger, more rigid and always steam-tight.
3. Prevents straining or spreading of bonnet end of valve which causes a loose fitting and unsafe bonnet—Safety First.
4. It prevents stripping of threads.
5. It permits easy accessibility to the valve at any time without injury to any part of it.
6. It is the only correct mechanical method of fastening bonnet to body of valve.
7. The external thread construction permits of a more compact shaped valve, consequently a stronger one.

For Sale by Leading Jobbers Everywhere

Manufactured by

PENBERTHY INJECTOR CO., LIMITED, WINDSOR, ONTARIO

Promote Friction at the Bench

Not mental—physical friction. Do not ask a workman to turn out a good job with a poor file.

When a file reaches its "inefficient point" it reduces physical friction but creates mental friction.

A man working with a poor file knows that he is not doing his best, knows that he is taking twice, or three times, as long to do the job and will surely be irritated if he is called to account for the result.

It is cheaper to supply a new file than it is to have a workman irritated for half an hour using an old one.

Have your factory superintendent and shop foremen see that their men turn in their files for new ones the moment they reach their "inefficient point."

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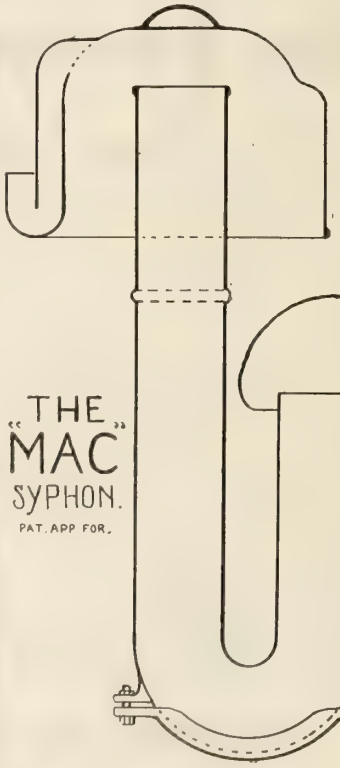

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'Tis seldom we would disagree;
But never having yet clasped hands
Sometimes both fail to understand
That each intends to do what's right
And treat each other 'honor bright.'

"With customers ten thousand strong,
Occasionally things go wrong —
Sometimes our fault, sometimes theirs,
Forbearance would decrease all cares.
If when we ship you by mistake,
Or on your bill some error make,
From irritation you'd be free
If I knew you and you knew me.

"Or when the checks don't come on time.
And you forgot to send a line,
We'd wait without anxiety
If I knew you and you knew me.

"Then let no doubting thoughts abide
Of firm, good faith on either side;
And any time you come this way,
That you will call, we hope and pray;
Then face to face we each shall see
And I'll know you and you'll know me."

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▫ ▫ ▫

When H. S. Holt, President of the Royal Bank of Canada, gave his address at the recent annual meeting of this institution, he said:

> "The proper course is to conserve the unusual profits and accumulate working capital, the lack of which is so prevalent and so detrimental to the general interests of the manufacturer."

Now Green, while not a manufacturer, has perceived "the proper course," and is conserving "unusual profits"—this by investing them in good liquid securities. Whenever he has $100 or so to spare he buys a bond yielding from 5 to 6%—something which can be turned into cash quickly, or deposited with his banker as security for a temporary loan.

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Also he makes use of his privileges as a subscriber to The Financial Post to consult with the Editors on matters pertaining to his business, his money investments, the market tendencies, and so on.

▫ ▫ ▫

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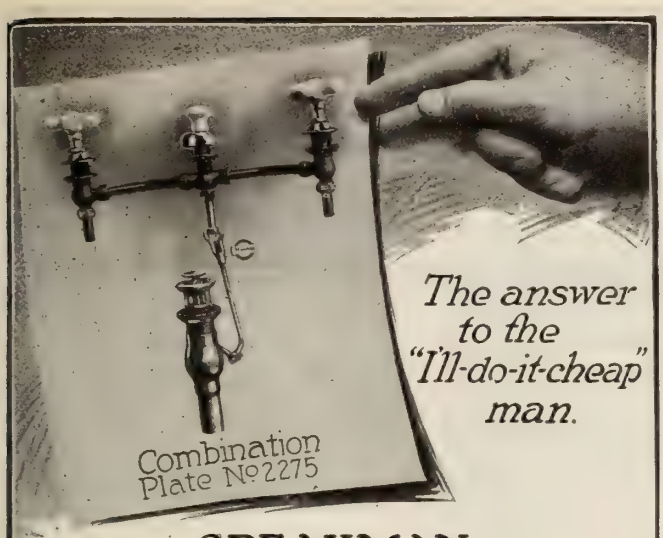

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SANITARY ENGINEER

PLUMBER AND STEAMFITTER OF CANADA

Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, JUNE 15, 1916 No. 12

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EDITORIAL

Waste Not—The Business Outlook—New Name for Price-Cutters—Build Up Your Credit—Editorial Notes.

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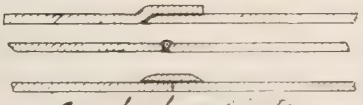

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of
DOMESTIC SANITARY AND HEATING ENGINEERS
TWENTY-FIRST ANNUAL CONVENTION

Held in Imperial Bank Building

London, Canada

June 20-22, 1916

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NOTE "MODERN TIME"

PROGRAMME:

TUESDAY, JUNE 20TH, 1916

9.30 a.m.—Meeting of Executive of Canadian Society

10.30 a.m.—Official Opening of 31st Annual Convention

12.00 a.m.—Adjourn for Lunch

TUESDAY AFTERNOON

1.30 p.m.—Address of Welcome by His Worship, Mayor Stevenson

Order of Business of the Canadian Society

TUESDAY EVENING

Announcement from the Chair

WEDNESDAY, JUNE 21ST

9.30 a.m.—Business Continued

12.30 a.m.—Adjournment

WEDNESDAY AFTERNOON

Sports at Springbrank

WEDNESDAY EVENING

8.30 p.m.—Banquet at Tecumseh House

THURSDAY, JUNE 22ND

9.30 a.m.—Business

THURSDAY AFTERNOON

2.30 p.m.—Auto Drive

THE SANITARY ENGINEER

VOL. X. JUNE 15, 1916 No. 12

London---The Convention City

The City of a Twin Convention, The National Association Celebrates Its 21st Birthday in London and the Ontario Society its Fifth Anniversary, A City Which Makes Business a Pleasure.

NO class of individual to-day has a greater future before him than has the dreamer, the dreamer who puts his dreams into practice gives them life, and a future. He is a man who sees visions ahead, and will build accordingly. He is the man who will be looked upon in days to come as the builder of commerce, of mechanics, of morals and prosperous living, such men are real true optimists, they prosper in all lands and always have done.

It is to the credit of men of this type that Canada holds such an important place in the world as she does to-day. Her cities, of which London, Ont., is one of the most important, had a very humble start. London with its wonderful railways, factories, streets and electric cars. Its splendid buildings, parks and natural waterways, London, the hub of Canadian commerce, had not a big booming start such as many a Canadian town or city these days has had.

In the fall of 1826 that sturdy Scotch Highlander, Peter McGregor, made the first clearing which is the City of London to-day. He built a log cabin within a stone's throw of the present main street. Others soon followed, and in a very short time a village had sprung up.

Like old London of the Motherland, London, Ontario, has never been a boom town, it has been and is solidly built upon a firm footing.

The London of to-day is the outcome of the faith of the past, and the London of the future will be as prosperous as the present shall make it.

The city stands to-day a living evidence of the richness of the soil of the country, a magnificent monument to the faith and zeal of the people.

Splendidly paved streets stretch their lavish length over the 6,000 acres that compose the city's area, and along miles of beautiful residential avenues.

Bathing at Port Stanley, London's harbor on Lake Erie connected by municipally owned and operated electric railway and providing competitive route for shippers as well as access to U.S. and Candian lake ports. The summer residence of many Londoners.

Carling Heights Camp, London, Ontario. As centre of the First Division Military Area, London has a large mobilization camp this year. In addition to the Carling Camp there are in the same vicinity the Hillcrest Camp, Merwin Camp, Grosvenor Camp and Frances Camp. Upwards of 12,000 *troops will be trained at London this year.*

Nor are the evidences of comfort confined to the central portion. Farther in all directions are to be found the homes of the thrifty industrial workers, less costly, it is true, than those of the central portions of the city, but of a style of architecture pleasing to the eye as well as useful has been adopted, making London pre-eminently a city of homes.

Earl Grey, during a visit, stated that London was a beautiful home-like city, and called attention to the fact that there were no tenements here. Another very interesting fact about London is that 80 per cent. of its citizens own the homes they live in. Workingmen of this class are very rare in this world. The old saying which was given birth by Henry George would not truly apply to the workingmen and citizens of London that "The rich are becoming richer and the poor becoming poorer." London is the home of public utilities, because it owns so many of its own utilities, beginning with its homes, its railways, lighting and waterworks, and a harbour at Port Stanley.

It is a city of thinkers, which is proved by all the public-owned utilities mentioned, and further, this sense of possession guarantees a real citizenship and makes for patriotism and good government, which has largely brought about the conspicuous absence of strife between capital and labor.

In short, all that tends to make an ideal city can be found in London, Ontario.

Three parks are the property of the city. Victoria Park, which has an area of over 14 acres, and is situated in the heart of the city; Queen's Park in East London, and Springbank Park (272 acres) situated on the banks of the River Thames, which is the largest natural park in any city of Eastern Canada.

Corner Richmond and Dundas Streets, London, Ontario. A holiday crowd. London has a population of 60,000, *one-fifth of whom are engaged in its industries, which number over* 250 *and manufacture over seventy different lines.*

London's Industries.

As a distributing point, London is unsurpassed, the perfect network of railways, of which it is the centre, giving it shipping facilities that few possess. Every day in the year 69 passenger trains and 189 freight trains arrive and depart from the city. Four trunk lines and seven branch lines radiate from the centre, and there is also a competitive water route for shippers. This is by the city-owned road, operated by the city and recenaly electrified, to Port Stanley, London's harbor on Lake Erie.

With cheap freight and passenger rates, this railway practically places London on the lake and in connection with the great lake steamship lines, affords direct com-

Visiting the Soldiers. One of the enormous gatherings which visit London periodically from the First Division Military Area to see soldiers' relatives stationed there.

munication with Canadian and United States ports.

This route is used to great advantage by manufacturers for the transportation of raw and semi-finished materials and fuel.

One instance will show its economic value.

The freight on a ton of steam coal is approximately $1.53 per ton from Pittsburg to London via Port Stanley, and the same would cost about 42 cents more by the Niagara frontier.

As all the railways entering London are connected with the city-owned road by interswitching, the prices quoted on goods are generally F.O.B. factory, nearly all London's factories being on railroad trackage.

London's factories are comprised of 75 distinct lines of manufacture, numbering over 250, and employ in the aggregate upwards of 12,000 people.

In the cigar business over a dozen firms are engaged, exceeded in Canada only by Montreal.

Two concerns engaged in the manufacture of plumbing and heating, brass goods; The Empire Manufacturing Co. Limited, and The McClary Mfg. Co. Ltd. manufacturing stoves, ranges and sheet metal products, are the largest of their kind in the British Empire.

It should be of particular interest to the sanitary and heating trade to know that over $1,000,000 worth of the brass goods and other supplies originate in London, the convention city, in which the Canadian society are to celebrate their 21st anniversary.

Other lines which are brought into being in London are:

Boots and shoes, garments, cardboard and wooden boxes, furniture, brass works of various kinds; boilers both for heating and power purposes; iron foundries and other iron working shops; steam engines, motors, threshing machines, agricultural implements, concrete products, bricks, lumber, tractors, jewelry, brushes, overalls, cereal products, gas meters, tool and axe handles, corsets, harness, pork products, show cases, ladders, electrical appliances of all kinds; art glass, scales, barrels, hosiery, mattresses, pumps, elevators, soap, bolts and nuts.

In the period of 10 years the output of these manufactories has increased from over 8 milions to nearly 16½ millions of dollars.

London is the seventh city in Canada as a manufacturing centre and is fourth in the province. The London Post Office is seventh in importance in the Dominion in point of revenue and more than that in importance. It is the distributing centre of over 700 offices and is the centre of one of the finest rural mail delivery systems in existence. Money orders paid from London offices amount to nearly one million dollars.

The citizens of London carry more insurance per cent. than any others in the Dominion, one family alone taking out policies recently amounting to nearly a quarter of a million dollars.

The market is a very important one and is largely patronized by its citizens. It is centrally located and provides accommodation for nearly 1,000 vehicles. Over two million dollars worth of fresh country products are sold on this market annually. The cheese market alone exceeds $1,000,000 annually. Sixty churches are located throughout London and two hospitals that are the pride of the citizens. Victoria Hospital, maintained by the city grant, is the second largest in Canada.

It has also one of the finest public comfort stations in Canada, situated on the ground level, beautiful in architecture as well as usefulness, and is the only one of its kind in the Dominion.

Those members of the Canadian, as well as Ontario Society, will do well to make due preparations to attend this 21st annual convention and make business as well as pleasure blend into one harmonious whole in the City of London, Ontario.

Toronto Globe's Query

Wants to Know if Sanitary Engineer is Wanting to License Paper Hangers—If Licensing Them Would Result in Better Public Service, We Certainly Would Advocate That Course.

IN our issue of April 15 last we had occasion to congratulate the Toronto Globe upon an article containing certain remarks from which we gathered that the Globe advocated the desirability of employing competent workmen for papering a house. The article in question certainly assumed that a man about to have his house papered would make enquiries as to the standing of the paperhanger and as to whether he had the equipment necessary to do the work. We not unnaturally, therefore, took it for granted that the Globe would also consider it necessary for the householder to employ competent workmen, and we congratulated our esteemed contemporary upon what appeared to us to be its highly commendable attitude in this respect. We should not have felt it necessary to refer to the Globe's viewpoint in the matter had it not been that this viewpoint differed materially from that taken by the same paper on a kindred subject, viz., the employment of competent plumbers to do plumbing work.

We are now in some doubt as to whether the congratulations expressed in our issue above referred to were not somewhat premature or whether they were not due to some misapprehension on our part as to the meaning of the article from which we quoted. The reason for this doubt which is now troubling our mind is a small paragraph in the Globe's issue of May 25th ult., which read as follows:

> Is The Sanitary Engineer thinking of starting an agitation to license paperhangers as well as plumbers?

It is only fair to ourselves and to the Globe to say that, in discussing the subject of the licensing of plumbers over which question we have crossed swords with the Globe on more than one occasion in time past, the subject of paperhanging had, as far as our memory serves us, never once been mentioned. The first reference to this branch of house work occurred in the Globe's own article we have just referred to. We are, therefore, somewhat at a loss to understand why the Globe should put it to us whether we are thinking of starting an agitation to license paperhangers. Should it ever fall to our lot to advocate such registration we should undoubtedly be compelled to give the Globe credit for having given birth to the idea. That the idea does contain the germ of something worthy of credit we do not think it would be very difficult to show.

We should not be overstating the case in saying that, in at least 60 or 70 per cent. of the cases in which walls are repapered in the City of Toronto, the old paper is not torn down, but the new is slap-dashed on, on top of the old. Some of the more reputable firms undoubtedly would refuse to do work in this slipshod manner, but the conditions we have mentioned are the exception rather than the rule. The writer has himself frequently come across instances in which as many as eight or ten layers of paper have been found one on top of the other, thus providing unlimited opportunities for the

(Continued on page 31.)

New Sanitary and Heating Goods

FOR CLEANER AND MORE SANITARY SWIMMING POOLS.

Anyone who has had experience with swimming pools appreciates how easily and quickly they become dirty. Bathers are constantly adding foreign matter to the water in the shape of hair, lint, cuticle, dye from clothing and plain dirt. Also dust and dirt blows in from the street, or is carried in from adjoining floors on the feet of the bathers.

To keep swimming pools clean in spite of the above conditions has been one of the greatest difficulties encountered by those whose duty it was to see that the pools were clean and sanitary.

Many methods have been employed. The most popular was the use of the refiltration pump system. This system was satisfactory to the extent that the finer substance was carried out of the pool, but the heavier substance such as grit, hair, and cuticle slowly settles to the bottom of the pool.

To overcome this difficulty it was thought that by using a larger pump and filter the conditions would be improved.

This was not successful, however, as a volume of water large enough and strong enough to keep the sediment from settling on the bottom would be so strong as to interfere with swimming and other sports.

The United Electric Company, Canton, approaching the necessity for a device that would be successful for this work, designed an apparatus that has absolutely proved its value. A great many have been tested out in actual usage and have given great satisfaction. We have changed the design slightly until now we have a proved finished product to the last detail.

Each territory has quite a few swimming pools equipped with a re-filtering system; some territories have hundreds.

Description

A—160 and A-161 are inlet valves, A-160 is used with exposed piping and A-161 with concealed piping. They are made of phosphor bronze with screw connection to fit a 2″ pipe.

A-156 is a swivel male phosphor bronze hose terminal with a screw connection which fits in the inlet valve. The other end is securely attached to the hose.

The hose is made especially for this work. It is made of extra heavy rubber and is rubber lined inside and out to withstand the action of the water. This hose is supplied in lengths from 10 to 50 feet, in multiples of ten feet.

If two lengths of hose are required extra A-156 and a No. A-144 which serves the purpose of a connector are furnished.

To the other end of the hose is attached a No. A-156 which is inserted in a three foot brass handle.

The handle at the top is provided with a specially constructed swivel which has a female screw connection that sets at an angle of 90 degrees. Also at the top of the handle is a bayonet locking device into which can be inserted the two extension handles, one being six feet long and the other seven feet making the total length of the handle sixteen feet.

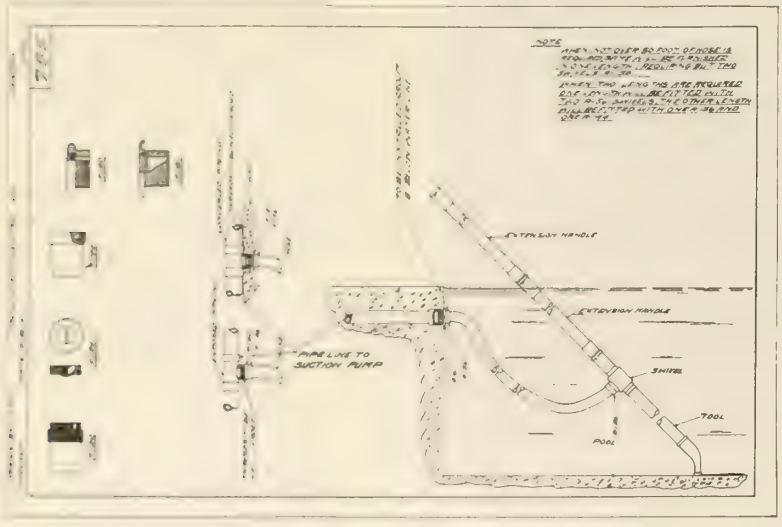
The handles are all brass tubes—heavy gauge.

At the bottom of the three foot handle is securely fastened the cleaning tool. This tool is made of phosphor bronze strongly constructed. The slot in the tool is 15″ long and ¾″ wide.

The tool has a brush attachment that easily dislodges any sediment which has adhered to the pool.

The connection is made to the suction line of the circulating pump and for convenience should be connected to the line close to the pump with a valve for cutting off placed in the valve pit. However, the connection can be made anywhere on the suction line. The water and material sucked up should not be allowed to pass through the filters because of the danger of clogging them. The water should be by-passed direct to the drain before reaching filters.

The above equipment can only be used when a refiltering system is installed. All modern swimming pools have them and the field is large.



Showing how sediment and other foreign matter can be removed from swimming baths.

NEW BOOKLETS

Never was there a day when manufacturers were issuing to the trade so much interesting and useful literature as at present. The latest booklet to be brought to our notice is now being distributed to sanitary and heating engineers by W. E. Clark Company, 28 Adelaide St., West.

This booklet contains some very interesting data on the increasing of temperature in hot water systems, as well as describing in detail the Clark temperature Booster manufactured by them. A post card to above address will procure one of these booklets.

TO PREVENT POLLUTION

The Internationl Joint Waterways commission will give a hearing at Buffalo June 21st on its plans to prevent the pollution of boundary waters by the construction of sewage disposal plants by the cities along the frontier. Tentative plans have been given officials of all the municipalities interested on both sides of the river. The estimated cost of a sewage disposal system for Buffalo is $3,600,000. The commission estimates the annual operating expense at $203,500. The estimated cost of two disposal plants Niagara Falls, (N.Y.) would require is $788,850; operating expenses, $28,500. The disposal plant for Niagara Falls (Ont.) would cost $83,000. The LaSalle plant would cost $40,000.

Many Plumbing Lines Are Short

Due to Scarcity of Labor and Embargoes on Shipments—Some Lines Require 9 to 10 Months to Fill as Compared with 2 to 3 Months a Short Time Ago—Canadian Manufacturers Working Under Extraordinary Conditions.

THE accompanying letter has been sent out from one of the largest firms doing business in this country as a warning and request to customers to anticipate in as far as safety allows, the requirements of their trade. The reputation of the house in question puts the sincerity of this letter beyond question. The facts embodied in it are here given in further detail, not in order that sanitary engineers may be urged to buy more liberally but that they may be freely cognizant of the facts as they are, and act according to their judgment.

The prices in all lines, wild though they have become, are of less importance than delivery in view of existing shortages which however are a gradual and general tightening up of supplies rather than any actual disappearance of any one line, except in the case of some specialized products for which substitutes are usually obtainable.

Raw Material Shortages

The shortages that are accruing result primarily from the tying up of factories through a shortage of raw material and this condition has been greatly aggravated of late by the numerous railroad embargoes.

Plumbers' supplies are probably the most difficult to procure of any one general line, on account of labor troubles and a shortage in all brass lines, so that no deliveries can be made under three months. Brass tubing from which many fixtures are made is very scarce. Enamelware, on the contrary, is fairly plentiful.

Some mills working on brass and copper tubing absolutely refuse to quote or book orders on account of their capacity having been so badly overtaxed already, and at best will only promise delivery in four or five months, and at that invariably stipulate that the agreement should not be binding on them in case of unlooked for developments that might further restrict their supply of raw material.

Tin Plate Exhausted

In sheet copper the best that can be done is to get promise of delivery in three months with no relief in sight at present. Tin plate supplies are practically exhausted, and stocks of light gauge are running very short, with no chance of early replenishment, and a similar condition exists in some pipe raw material.

Gentlemen:—

On account of the great and constantly increasing difficulty of securing reasonably prompt deliveries of the raw materials entering into our varied line of products and the scarcity of both skilled and unskilled labor, due to the large number of workmen in all trades who have enlisted for overseas service and the large number who have left their regular occupations and are now engaged on munitions work, a curtailment of output and the consequent lengthening of deliveries are inevitable.

Furthermore, we wish to emphasize the fact that higher prices are also inevitable and will probably obtain for a long time to come, due primarily to the increased cost of raw materials, the scarcity of labor and the present embargo on shipments from Europe which makes us dependent on receiving supplies from the United States, where the rise in prices during the past year has been unprecedented. As an illustration we submit the following table which shows the increases there from March, 1915, to March, 1916:

Copper	100%
Pig iron	60%
Tool steel	600%
Steel castings	33%
Forging billets	150%
Insulating materials	35%
Varnished cambric	35%
Mica sheets	25%
Steel plates	300%
Electric steel	150%
Tin	50%
Lead	150%
Brass	200%
Spelter	300%
Cold rolled steel	220%
Ferro-manganese	1000%

The difficulty experienced in obtaining these materials should also be borne in mind. For instance, bars and plates which a few months ago could be secured in 30 or 60 days now take from 9 to 10 months. Copper which we could secure in 30 days now requires 4 months, and shipping promises on cold rolled steel run well in 1917, and such orders must be entered without cancellation privileges.

We are issuing this circular letter to our customers in order that they may thoroughly appreciate the extraordinary conditions under which Canadian manufacturers are now operating and may co-operate with ourselves and other manufacturers by anticipating their requirements as far ahead as possible and thus avoid the disappointments that will result if the placing of orders is put off until the apparatus or the materials are actually required.

Yours truly,

Marking Up Prices

One large jobber of heavy goods and plumbers' supplies says: "It is particularly distressing in view of these conditions that prices are not better maintained by sanitary and heating engineers. We have heard of many cases where sanitary and heating engineers are actually selling goods for less than they can buy them for to-day.

It is unnecessary for one man to sell low because another is doing so. A case in point is that of a sanitary engineer who, in an endeavor to secure a contract, tendered a price, and in making up his estimates based his quotations upon prices paid nearly a year ago, in spite of the fact that he knew he would have to pay higher for the next supply he ordered, and in discussing the situation calmly, replied that as the plumbing and heating business was so slack, one had to do such things on purpose to secure business. Such an explanation is simply foolish.

It is natural and only right that when prevailing cost prices rise, a corresponding rise in price should be charged, because just as soon as prices lower, a reduction is demanded.

The public expect to pay increased prices when materials increase in price to their retailer, and the same applies when a reduction in cost takes place.

The writer came across one case where actually 15 per cent. less than cost was charged for a bill of plumbing goods, and the goods had been bought three months ago. If this particular person had taken the goods to his jobber he would have procured a better price.

COST OF LEAKY TAPS IN TORONTO

The Toronto Waterworks Department is entirely favorable to the free use of water for all legitimate purposes, but there is a lot of water wasted. Leaky taps and plumbing fixtures generally account for a big part of the waste.

A leaky tap discharging water drop by drop, with distinct periods between the drops, wastes 15 gallons per day. A tap that dribbles, wastes 90 gallons per day.

Are there taps or other fixtures on your premises wasting the city's money (i.e., your money) right now?

The above item should prove of great interest to every sanitary engineer in Canada in that by advocating constant repairing of all leaking fixtures he is not only creating business for himself, but is also conserving the city's wealth in so doing. The best course, however, to pursue is to sell and instal none but reliable brass goods, which will not only save water and give better service, but will cut down repairs to nil.

THE SANITARY ENGINEER

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Circulating amongst Sanitary, Heating and Ventilating Engineers, Gas Fitters, Sanitary Inspectors, City Engineers, Boards of Health, Architects, etc.

JUNE 15, 1916

WASTE NOT

ONE of the most prevalent evils in existence and one to which almost every person on earth is heir is that of trying to get something for less than its real value. The average business man is striving to secure bargains and big demands, and at the same time make big profits. It never seems to dawn upon humanity that there's a price for everything and in some way or other that price *must be paid.*

The buyer gets an article for $1 which cost $1.25 to put into his hands; does that buyer for one moment think who pays that missing 25c? Why, the buyer, of course, every time. He may take possession of the article, use it and pay $1 down, but in some way or other the extra 25 cents has to be paid. How is this being paid? By the fact that things do not give the service these days that they did in days gone by. In the sanitary and heating business, for instance, the job fitted up with cheap lines simply means that costly labor has been spent in producing them, costly labor in installing them, and costly labor is expended in keeping them in repair. Then the material, too, has been wasted; the same metals are necessary if the proportions are right to make higher grade goods. Therefore, there is waste going on at every turn.

Of course most of the metals can be refined and reclaimed, but time, time which is more precious even than life, time, used or misused, demands its price. All the men killed in this terrible war will be replaced in a few years, but the time taken from productive labor, from moral upbuilding, can never be replaced and reclaimed. The time taken in killing these precious fellows can never be brought back into the melting pot like metals and refined.

The workman who thinks he is "putting one over on his boss" when he is doing the least amount of work for cash received, is putting 10 over on himself and the same with the employer who thinks he can get a 30-cent man to do a 50-cent man's work. The boss who tries to handle his men as if they were so much "butcher meat" per hour, should not be in business. Both such employee and employer are wasting time. They should, if they expect to make a success in life, put a little personality into everything they do. Both should put a little more into each other than they expect to get out. In short, they should confide more in one another, consider each other from as many angles as possible. The driver of a horse never attempts to skimp on the oats if he wants his horse to pull an extra load, or the motor driver skimp on gasoline if he ever hopes to "get there and back."

Therefore, "Waste not," and thus "Want not." Want not in service. Want not in character. Waste not is the true business want not.

THE BUSINESS OUTLOOK

ON another page there appears an article which deals with the outlook in the building trade. Mr. Eken, the gentleman quoted, needs no introduction to the trade, particularly those sanitary and heating engineers who execute large-sized work.

The fact that there are quite a number of large buildings under way, will be regarded with no small amount of satisfaction by those who do smaller jobs. The writer has made numerous inquiries recently in and around a number of small towns, and from quite a number of travelers, too, and the impression appears to be general that small towns are doing the bulk of the business. Farmers are installing sanitary

The Man Without a Sense of Humor May Get His Three Good Meals a Day and a Good Home to Live in. But He Misses Most of Those Things Which Make Life Worth Living.

and heating systems at a much greater rate to-day than ever before in the history of the country.

But there is a danger point even in this class of business which must be guarded against that of cheap cut price contracts. Nothing under the sun will reflect as great an amount of discredit upon the trade if such work is done. The farmer who lives in out-of-way places, cannot always be calling up for a repair man, and is slow to forget trouble brought to his home by what is looked upon by many farmers as a luxury.

At the same time this same class of customer would be the very first to voice an untold amount of praise at a good satisfactory free-from-trouble installation.

It is all a case of putting in the most serviceable line of goods and employing practical labor to install the goods.

Every installation becomes an everlasting advertisement, good or bad, and cheap, low-priced goods and labor never yet brought a second order. It is not always the first job which pays all the profit it should, but rather the repeat orders.

No salesman or manufacturer is satisfied with a line which does not bring back repeat orders and the sanitary and heating installation which cannot and does not bring repeat orders, or in other words, pull more new orders, is not just as good as it should be.

There is no doubt a decided improvement taking place in the plumbing trade as a whole, and nothing should be used, either goods or labor that will not give maximum service at a minimum cost of upkeep.

NEW NAME FOR PRICE-CUTTERS

PRICE-CUTTERS have been referred to by the vice-chairman of the United States Trade Commission as the "Wolves of Industry." With shark-like methods they attack from underneath.

Nothing is more contemptible than the conduct of the man who, while knowing that he is going to lose money on a job, cuts his price, after he has found that by so doing he is able to steal a contract from another member of the craft who has tendered on a contract, and is possibly a better business man than he. And no doubt a large number of failures in business are brought about by the "snake-in-the-grass" practice of price-cutting.

Of the 22,000 failures in the United States last year, some 90 per cent. of these are attributed to small retailers who cut their prices.

H. O. Roberts, secretary of the Minnesota Retail Hardware Association, on the other hand, attributes the failure of some 21,000 of these to the way they extended credit.

One authority says it was price-cutting that put the quietus on so many: another asserts it was the way credit was extended.

If a minute analysis were made it would no doubt be found that both were contributing causes. In a measure the two things are closely allied.

Price-cutting is a general reduction of the margin of profit. It is short-sighted business in that it fails to take cognizance of the cost of doing business. Laxity in the extension of credit means that the profits on cash sales are cut down. If the dead-beat gets away with the goods the loss has to be borne somewhere.

BUILD UP YOUR CREDIT

IT ought to be a criminal act in these days of enlightenment for a person to start up in business, obtain a line of credit and then, in a short time, find that because he had no idea of the fundamental principles of honesty, he has to assign and ask for a settlement of a few cents on the dollar. Such things are taking place every day and will continue to do so as long as it is possible to get material on credit and not be held criminally responsible for value of goods received.

Such a statement may appear to be rather harsh, but here is the situation: A manufacturer or jobber furnishes goods. He expects that a certain amount of these goods will never be paid for, and when striking off his overhead expenses he allows a certain amount for losses. What does this mean? Simply that the man who pays for the goods he buys, also pays for the goods that the other fellow receives, but does not pay for.

A certain jobber recently stated that cost of collecting from "slow pays" and the actual monetary losses combined, amounted to 7½ per cent. of their total volume of business, which simply means that if everybody paid, and paid promptly, they could buy at 7½ per cent. less cost, without encroaching upon the jobber's profit. Furthermore, if every person in the sanitary and heating business would see to it that they collect their accounts more promptly, and in turn paid the accounts they owe promptly at 30 days, a 2 per cent. extra could be saved.

The only thing to do from now on is to pay more attention to collections. Ask for no credit unless provisions are first made to meet the obligations, thus building up one's credit.

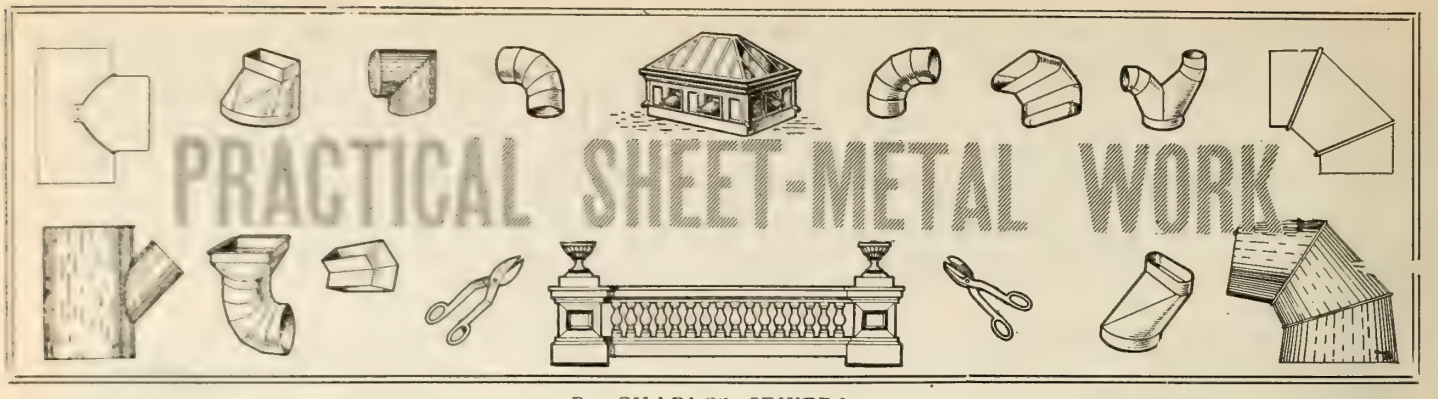
EDITORIAL NOTES

HONEST service is the best and cheapest advertising medium known to trade.

* * *

ONE of the amendments to the Ontario Companies Act, passed at the session just held, provides that if any person or persons trade or carry on business under any name or title of which "limited" is the last word, that person or those persons shall, unless duly incorporated with limited liability, be liable to a fine not exceeding $10 for every day upon which that name or title has been used.

The Same With the Man Who Seldom, if Ever, Meets His Fellow Craftsman at Least Once a Year. This Means You. Get Busy and Take in the 21st Annual Convention, June 19, 20, 21 and 22, to be Held in London, Ontario.



By CHARLES SEIVERS

IN this article is shown a flared article, round at top and oblong at bottom, both on the same plane or parallel. It is shown by the elevation that the top is not centred over the bottom, but set over one side, as shown in plan.

Divide the circle in plan into four equal parts, 1 5, 9 13, dividing it so that the diameters drawn from 1 9 and 5 13 parallel the sides, 1 9 and 5 13. From 1 5 draw lines to point A; from 5 9 draw lines to B; from 9 13 to C and 13 1 to D, divide each section of circle into equal parts, and from each point draw lines to A B C and D respectively, as shown by A 1 2 3 4 5, etc. These lines form the bases of the different triangles, the heights of which are all the same, as shown by C E on elevation. By drawing out an angle, as shown by X A 1, and setting off the different base lines from A 1 to A 5, it will aid somewhat; in the same manner form angles, as shown, with height equal to elevation and bases equal to points B 5 to B 9 respectively, all as shown in elevation of angles.

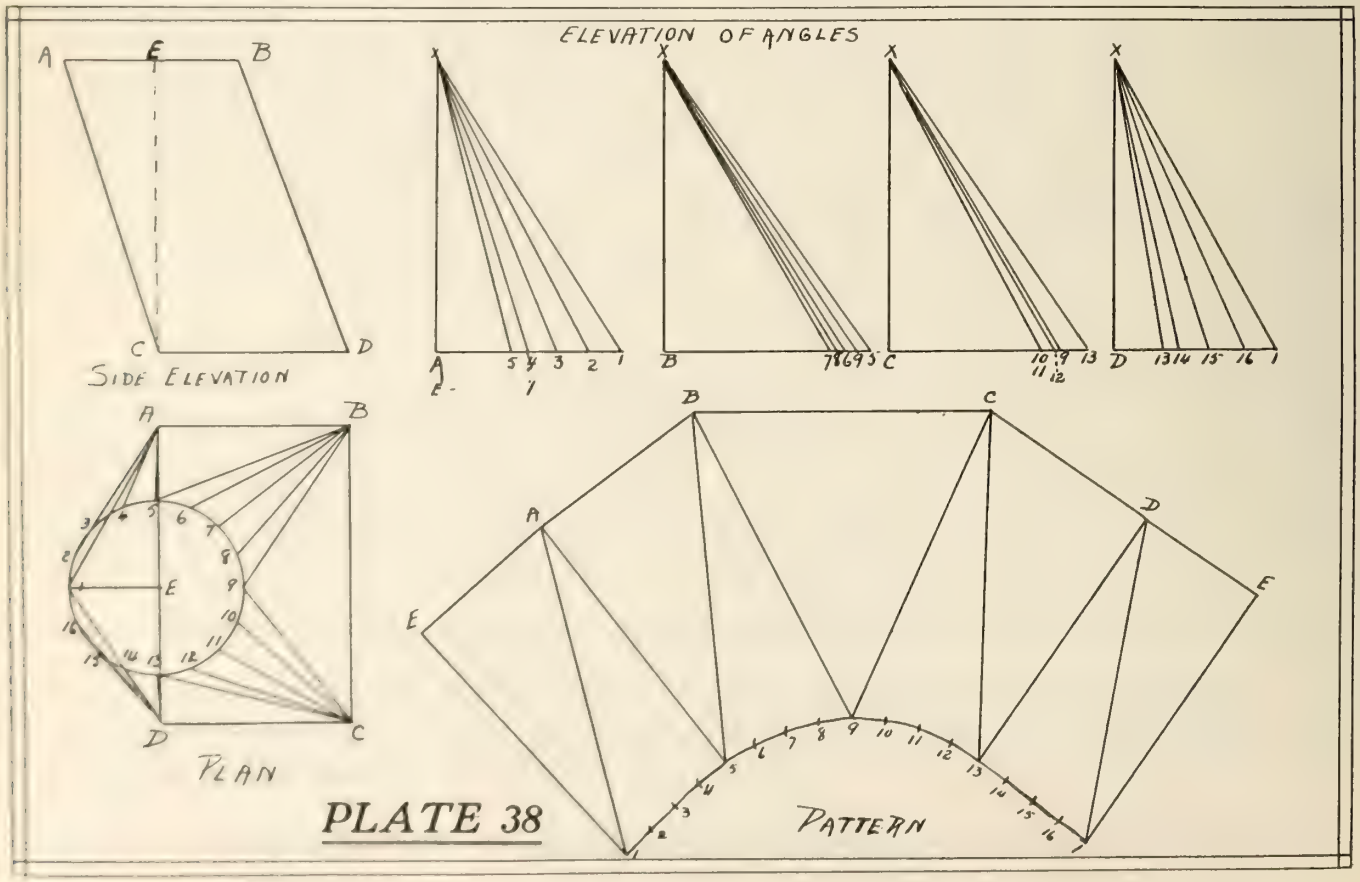
Proceed in same manner with base lines from C 9 to C 13, and D 13 to D 1. When all have been set off, the pattern can be struck out.

Draw a line to start pattern, as E 1. With E 1 on plan as base line and A 1 as height, obtain distance X 1. Note in this case 4 and E 1 are same distance. And with this as a radius and E on pattern, strike an arc on line drawn, thus obtaining point 1. With E A on plan as a radius and E of pattern as a centre draw an arc. With distance X 1 at angles A as a radius and point 1 as centre draw an arc, intersecting the one drawn from E. Now draw lines joining E A and A 1. With X 2 as a radius and A on pattern as a centre, strike an arc near point 1. With compasses set at one division of circle as a radius and point 1 as a centre, draw an arc cutting the one drawn from A, thus obtaining point 2; in same manner use X 3, X 4, and X 5 as radii, and draw arcs from A, intersecting each by arc drawn from last obtained point, its radius being one division of top. When point 5 is obtained draw a line joining 5 A.

With A B of plan as a radius and A as a centre draw an arc. With X 5 at angles at B as a radius and point 5 of pattern as a centre draw an arc, cutting one just drawn, thus obtaining point B. Now draw lines joining A B and B 5. With B as a centre, set off arcs, with X 6, X 7, X 8, X 9 as radii, intersecting each with arc drawn from point 5, to obtain point 6, 6 to 7, etc., as shown by 6 7, 8 9.

When point 9 is obtained, draw line

(Continued on page 34.)



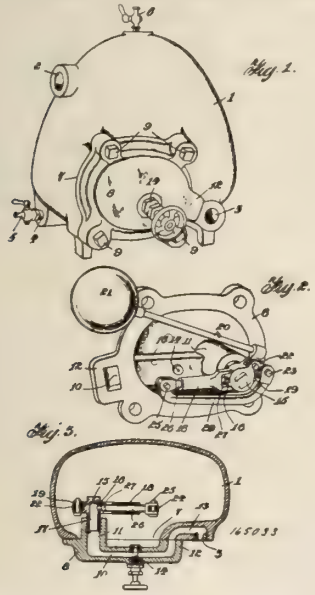
New Canadian Patents

No. 165,033

Eugene Solomon Manny, Montreal, Quebec, Canada, 21st September, 1915; 6 years. Filed 13th January, 1915. Receipt No. 246,941.

Claim.—1. In a steam trap, a casing having an open side, an inlet towards the top and an outlet towards the bottom in the form of a D-shaped port, a cover for said open side, having a passage in its wall communicating at its outlet end with said port, a hollow plug closing the inlet end of the passage and having a lateral opening with a valve seat thereabout, a valve guide extending from said plug adjacent to said valve seat in a substantially horizontal position, a valve slidable in said guide, a bell crank lever pivotally supported by said plug, a float extending rigidly from the upper end of said bell crank lever, and a bent lever pivotally connected at one end to the other end of said bell crank lever and at its other end to said valve.

2. In a steam trap, a casing having an



No. 165,033. Steam Trap.

open side, an inlet towards the top, and an outlet towards the bottom in the form of a D-shaped port, a cover for said open side having a passage in its wall communicating at its outlet end with said port, a float pivotally carried by said cover, a valve adapted to open and close the inlet end of said passage, lever mechanism operatively connecting said float and valve, and a by-pass in said passage to permit the passage of water direct between the casing and passage, as herein described and set forth.

No. 164,905

Frank S. J. Hollister, Toronto, Ontario, Canada, 14th September, 1915; 6 years. Filed 5th June, 1913. Receipt No. 225,228.

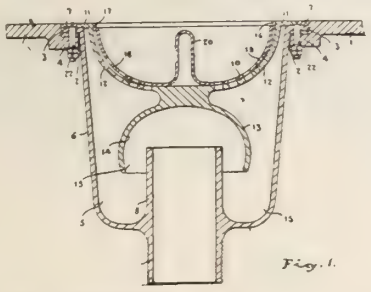


Fig. 1.

No. 164,905.

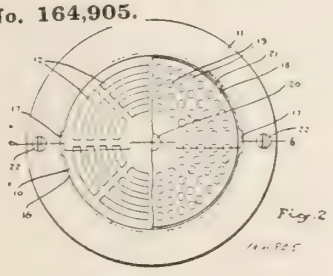


Fig. 2

Waste Connection for Sinks.

Claim.—1. A waste connection for sinks, comprising a cup-shaped member supported in the sink opening and having a tubular member extending upwardly from the bottom, a perforated dished member supported in the top of said cup member and having an inverted cup-shaped flange extending from the bottom, extending over the top of the tubular portion of the cup member and forming a trap, said flange being curved inwardly at the bottom edge, and a perforated dish-shaped strainer resting in the perforated dished member.

2. A waste connection for sinks, comprising a cup-shaped member supported in the sink opening and having a central passage therefrom, a perforated dished member supported in the top of said cup-shaped member having an inwardly extending flange at the top, said flange having a radial opening therein, and a dished strainer having a laterally projecting lug adapted to pass through the opening in said flange and to extend thereunder when turned and also having a raised central portion forming a handle.

3. A waste connection for sinks, comprising a cup-shaped member supported in the sink opening and having a tubular member extending upwardly from the bottom, a dished member supported in the top of the said cup and having a plurality of concentric slots therethrough forming a grid and an inverted cup on the bottom thereof extending over the top of said tubular member and forming a trap, and a pressed sheet metal cup adapted to rest in said slotted member having a plurality of concentric rows of small perforations registering with the slots in the under member, and a centrally drawn stem portion forming a handle.

No. 164,767

Richard Egan, Montreal, Quebec, Canada, 7th September, 1915; 6 years. Filed 22nd May, 1915. Receipt No. 252,072.

Claim.—1. In a humidifier, the combination with a steam generating chamber having a suitable exhaust, of a regulating tank having an inlet connected to a water supply and an outlet connected to said generating chamber, a hinged float, and a valve secured to said float and stopping said inlet in the extreme upper portion of said float.

2. In a humidifier, the combination

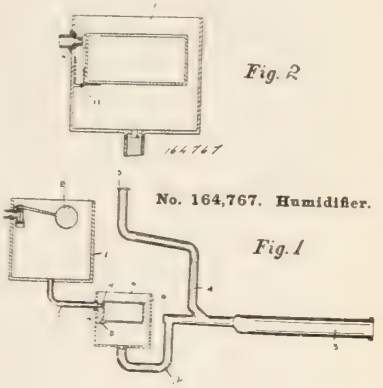


Fig. 2

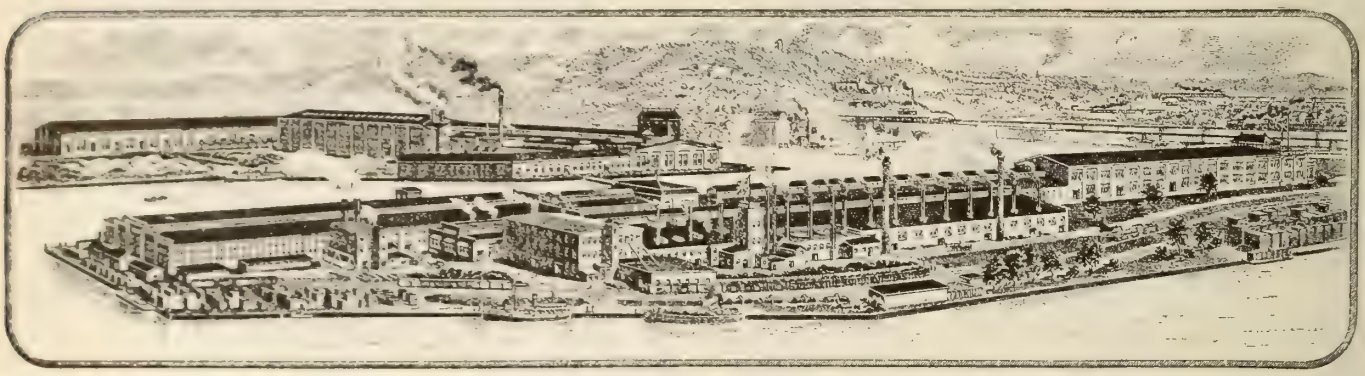
No. 164,767. Humidifier.

Fig. 1

with a steam generating chamber, of a regulating tank having an inlet and an outlet, and a float valve hinged to the wall, and having an engaging face above said hinge joint, a cistern connected to a water supply having a float operated valve and an outlet, a pipe connecting said outlet to said regulating tank and terminating in a valve seat engaged by said valve face, a U-shaped pipe leading from the lower end of said regulating tank to a direct channel to said generating chamber and a steam pipe leading from said direct channel to a suitable outlet.

Plumbing Concern Being Reorganized

Standard Ideal Manufacturing Company of Port Hope, Ont., Organized in 1903 and Stated to be the Largest Plant of Its Kind in the British Empire—Business Amounted to About $1,000,000 a Year in Normal Times.



THE Standard Ideal Co., of Port Hope, Ont., manufacturers of plumbing supplies, is in a process of reorganization under the supervision of the Montreal Trust Co. representing the bondholders of the concern. The concern is stated by the principals to be the largest of its kind in the British Empire. It was organized in 1903 and the officers were H. T. Bush, president; W. S. Brock, vice-president, and C. E. Sheriff, secretary. The company was organized with a capitalization of $500,000 common stock and $200,000 seven per cent. cumulative preferred. The shares were sold at $100 each. The parties interested in the concern in a financial way are people outside of Port Hope. People in the town of Port Hope had not invested any money in the concern but the company was given a free site of five acres on the lake front of Ontario. The town also gave the company exemption from taxation with the exception of school taxes.

The company has a fine location on the water front and the buildings of the concern are modern and of brick and wood. Their site covers an area of five acres with splendid docks and facilities for shipping raw materials and goods by water. The plant when in full operation employed three hundred men and their yearly output under normal business conditions was approximately $1,000,000.

Under the present war conditions business has decreased owing to the falling off in the building trade and the plant has been running at about half capacity, employing recently about 150 men. Extensive developments were under way and a considerable amount of new machinery was being installed at the time the present depression and war conditions intervened. Over-enthusiasm coupled with the lull in building operations operated to cause a certain nervousness on the part of the bond holders of the company. It was accordingly decided to look over the affairs of the concern and to that end the Montreal Trust Company assumed control and a manager of the works was put in under their supervision. The works are still running and there is every prospect that they will continue to do so after the reorganization is completed.

The Standard Ideal Company has had a rapid growth as will be indicated by the large business which had been developed. When the business was in operation in normal times, as already stated, the concern was doing a business of approximately one million dollars a year. This trade was purely a domestic one in Canada, no efforts as yet having been made to develop an export business. The company has been manufacturing a complete line of plumbing fixtures such as baths, sinks, and enamelware of all kinds.

The value of the plant at the present time is well over a half million dollars. The bondholders have an investment of $616,000 in the plant and it is in their interest that the reorganization is being effected. The funded debt of the concern is $615,000 secured by first mortgage six per cent. gold bonds, dated January 2, 1911, and due January 2, 1941. Interest was payable half-yearly in January and July to the Bank of Montreal. The bondholders were secured by a lien on all the property of the company. Of the original debt of $661,000 which stood against the concern $45,000 has been redeemed.

The directors of the original company, were H. T. Bush, A. E. Pipher, W. S. Brock, C. E. Sheriff and W. B. Perry. The concern has been a big help to the town of Port Hope from an industrial standpoint as some three hundred workmen were employed in the plant who spent their earnings in the town. There is every confidence that the affairs of the company will be found in such shape after the trustees have made their investigations that the business will continue to operate in Port Hope. Up to the present the trustees have not yet pursued their investigations to a point where it is possible to tell whether the liabilities exceed the assets. It is felt that whatever may be the outcome of the investigation in this respect that the plant will still continue to be operated in the town. The enormous business which the concern has done in past years has amply demonstrated the excellent field for such an industry in Canada.

H. T. Bush, the president and organizer of the company, was formerly with the Ideal Manufacturing Company of Detroit. In 1902 he succeeded in getting some Cleveland capitalists interested in the organization of the company and the organization was completed in that year and the following year. The first articles were manufactured in the year 1904. In the original company, as it was organized in 1903, and known as the Standard Ideal Sanitary Manufacturing Company, there were some eight or nine Cleveland, Ohio, capitalists. The only Canadian directors associated with them at that time were W. S. Brock of Winnipeg and A. D. McArthur of Toronto. A few years after this reorganization the word "Sanitary" was dropped from the name of the company as being unwieldy.

In 1910 the company was reorganized, when the Cleveland interests disposed of their holdings in the company and the bondholders through the Royal Securities Company was given a first mortgage of $661,000 on the plant. This amount in all probability represented about 50 per cent. of the value of the plant. At this reorganization common stock to the value of $350,000 was allotted to H. T. Bush, A. E. Pipher, W. S. Brock and A.

D. MacArthur in lieu of their interest in the concern which the new company displaced. Mr. MacArthur continued with the company until the year 1913 as the Toronto sales agent when his connection with the company was severed owing to differences with H. T. Bush. Mr. MacArthur has now been appointed Toronto representative of the company in the interests of the bondholders and is in charge of the showrooms of the Standard Ideal Manufacturing Company at 119 King street East.

Suit Over Label

Dealers and others connected with the plumbing trade will recall the long-drawn out litigation between the Standard Sanitary Manufacturing Company of Pittsburg, Pa., and the Standard Ideal Manufacturing Company of Canada. The suit was brought by the former company about the year 1910 against the Standard Ideal Company for an alleged infringement in the use of the name "Standard" and in the use of the green and gold label without the actual trade-mark of the Standard Sanitary Manufacturing Company. The case was tried in Montreal and decision was given in the County Court and Supreme Court of that province in favor of the Standard Sanitary Company. No damages were assessed on that occasion. But the Standard Ideal Manufacturing Company decided to carry an appeal to the Privy Council in England.

This court of last resort sustained the appeal and in giving judgment stated that it was not possible for any firm to monopolize such a word as "Standard" for its exclusive use.

The Montreal representative of the Standard Ideal Manufacturing Company is J. Seville and the Western manager is W. S. Brock. When the Montreal Trust Company took charge of the concern in the interests of the bondholders A. E. Pipher, who occupied the position of mechanical works superintendent, was relieved of his duties. Shortly after Mr. Bush was relieved of his duties and Mr. Pipher was reinstated and is now in charge of the operation of the plant for the Montreal Trust Company.

The Standard Ideal Company in January, 1915, did not pay the regular half-yearly interest due January 2 on the $615,000 outstanding six per cent. first mortgage gold bonds. The consequent falling off in business as a result of the building depression made it impossible for the company to meet its interest payments and the assets were consequently taken over by the trustees in behalf of the bondholders. One of the bondholders is understood to be Sir Max Aitken, president of the Montreal Trust Company.

Building and the Business Outlook

President of One of the Larger Construction Companies Says That Taken All Round Cost of Erecting New Buildings is Less Now Than Before the War, and He Says Also That Many New Buildings Are Projected and Will be Started This Year

Reprinted from June 10th issue of The Financial Post, Toronto.

"THERE is more building in prospect in Canada at the present time than has been in sight since before the war," was the encouraging statement made to The Financial Post this week by Andrew J. Eken, Montreal, vice-president of the George Fuller Construction Co., and a man in very close touch with building conditions throughout the Dominion. The Fuller Co. is the largest of its kind in the world. It is controlled by Harry S. Black, New York, a native of Cobourg, Ontario, and a son of a former British officer.

To prove this contention, Mr. Eken enumerated a long list of buildings, the construction of which has already commenced or will be commenced in the near future. These comprise, for the most part, factory plants, though there are also important developments pending in the way of elevators, storage warehouses and hotels.

"There is a decided boom in the construction of industrial plants in Ontario," declared Mr. Eken. "Most Canadian manufacturers are working in old buildings, with poor facilities in the way of light and ventilation. Many of them have come to a realization of the fact that, if they are to keep up with general industrial developments both here and in the United States, they will have to modernize their establishments, scrapping their old plants and erecting new and up-to-date buildings. More American concerns will erect plants to supply Canadian trade. This is the motive that is back of much of the present activity in factory construction.

"The building of grain elevators is also an important development of the present time. At least six big ones are being erected this year, located all the way from the Atlantic to the Pacific. It was thought a year ago that Canada had plenty of elevator accommodation. Last year's crop disproved that idea. The Montreal Harbor Commissioners have found it necessary to add another elevator to their system in spite of the belief that no enlargement of their facilities would be needed for some time.

"Another direction in which increasing activity is to be noted is in the matter of storage warehouses. There is a great scarcity of such buildings. At the present time most warehouses are nothing but fire-traps and the substitution of commodious fireproof structures has become most desirable."

Mr. Eken was asked as to the effect of the war on building costs and the probable trend of events in the building field after peace will have been declared.

"Taken altogether, costs are below normal," he said, "and that has been the reason for a good deal of the present building activity. Of course, steel has been scarce and expensive, but other materials have been cheaper. We have not experienced any special difficulty in getting labor, excepting in Toronto, in spite of the drain of recruiting, and wages have been on a somewhat lower scale than before the war. Altogether it appears to be a favorable time to undertake construction. Mr. H. H. Fudger, of the Robert Simpson Co., when he decided to proceed with the erection of the big mail order building for his company, went into the question of comparative costs very thoroughly and came to the conclusion that the present was the time to take action.

"As for the outlook after the war, I cannot help but feel that there will be a great building activity, when once peace is declared. I know of various factory developments that have been held up by the war and these will be proceeded with. The country will be in for a boom and building will have to be carried on, on a large scale to keep up with developments. Our faith in the future of Canada is so strong that we have maintained our organization all through the dull period, and we have put a great many hundreds of thousands in building investments in Canada.

Among the undertakings to which Mr. Eken referred as being under way were the large automobile plant for the Willys-Overland Co., a new plant for the Ford Company; a big factory for the Russell Motor Car Company; new buildings for the Hydro-Electric Commission of Toronto; factory for the T. Eaton Co., etc.

The hotel situation in Toronto has been a matter of much interest to Mr. Eken, who considers the accommodation in this particular as most inadequate for a city its size. He gave The Post to understand that he had recently tendered on a million and half dollar hotel project, plans for which were being prepared by Post, the New York architect. This hotel, if necessary arrangements materialize, will be erected on Yonge street, on property the sale of which for a million dollars, was recorded some months ago in The Financial Post.

Rural Sanitation

A Continuation of the Sanitary Science Course That Has Been Appearing in the Sanitary Engineer, But Having Particular Reference to the Sanitary Disposal of Household Wastes in Unsewered Districts

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 5

Septic and Settling Tanks

THE development of the septic tank was traced in the last article. For large plants it probably reached its greatest popularity in America in about the year 1906. It has for various reasons since declined in popularity and now there is, as far as the writer knows, no city or town in America that contemplates using or would use a septic tank (in the form as then known) as part of the treatment of sewage if building a new sewage disposal plant. There are, however, reasons that make it particularly suitable for small plants in connection with private residences, etc.

Extravagant claims have been made for the septic tank. It was claimed that all solids in sewage would be destroyed and the liquid sewage purified. We yet hear users of small septic tanks claiming that "only clear water leaves the tank which has never been cleaned for years and that no solids have accumulated in the tank." Such statements indicate a lack of intelligent observation; what actually happens will be shortly demonstrated.

From an adult there is discharged each day about half a gallon of excretal matter, feces and urine, about one pound of which is originally solid matter. Part of this solid matter is soluble but part remains suspended in the liquids. Combined with toilet paper, soap, grease and kitchen wastes that may get into the sewer there can be counted for each person in the house a little less than one-quarter of a pound of suspended or undissolved matter per day. One-half of this is mineral dirt; the remainder is objectionable animal or vegetable dirt. Depending on the amount of water used in the household and reaching the sewer this would give from about one-half a [illegible] of objectionable solid matter to a pail of sewage to two or less tablespoonfuls in a wine barrelful. There is usually somewhat less than twice this amount of dissolved objectionable animal or vegetable matter. Although this seems a small amount of [illegible] to treat but costly ex[illegible] cannot be trifled with.

In sewage reaching a septic tank there are certain solids light enough to float and others that are heavier than water. The flow in the tank being greatly reduced, the heavier particles fall to the bottom of the tank. Some of the lighter may lose the gas that causes them to float and they will also fall to the bottom.

"Sludge" is a term applied to the solids that settle to the bottom of the tank. "Scum" has reference to the floating matters and also to the mat that forms on the top of the liquid in a septic tank. The scum generally becomes leathery and effectually keeps out the air from the tank liquid.

The settling of the solids to the bottom of the tank may be regarded as merely a mechanical change, the chemical or bacterial change in a tank when first used being very small indeed. If such a tank is cleaned out every six weeks it is generally considered that it is not a septic tank but merely a "plain sedimentation" or settling tank; bacterial action is not desired or depended upon. In practice in settling tanks sewage may flow through in from 1 to 12 hours; from 2½ to 4 hours is advised. Also, in practice such tanks are cleaned out from every few days to every few weeks; cleaning is advised from every three to seven days in summer to from eight to twelve days in winter.

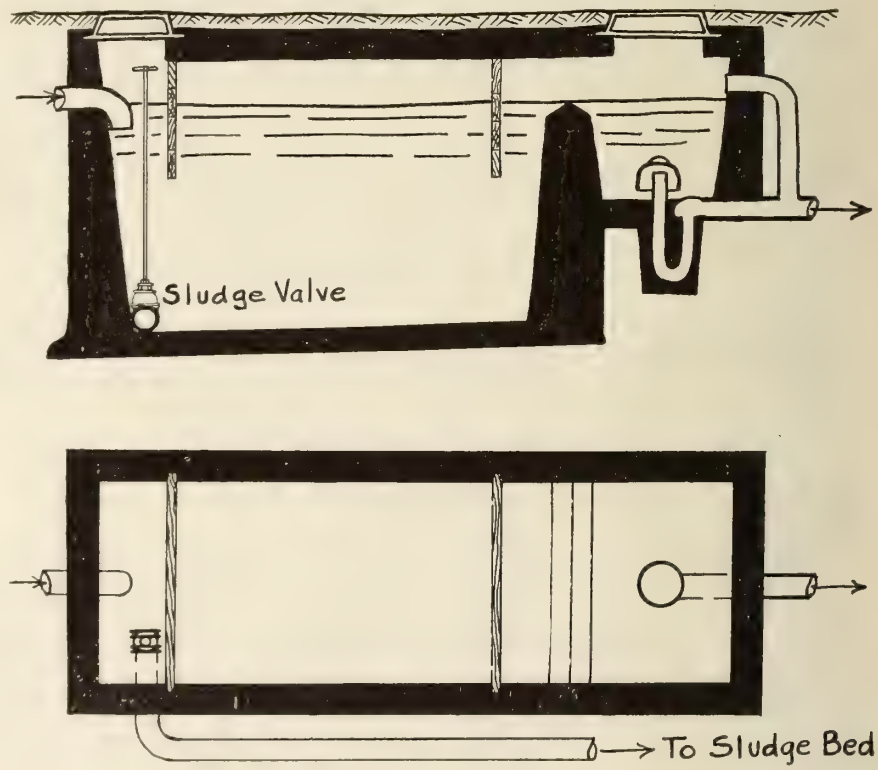


FIG. 16 – Plan and Section of Settling Tank

The advantage of such a tank is that the sewage that flows from the tank is a "fresh" sewage, freed from 50 to 75 per cent. of the solids and it has been found, for reasons to be explained, that it is generally easier to further treat and purify such fresh liquid sewage than that from a regular septic tank.

The great disadvantage is of course the frequent disposal of the sludge from

a settling tank. For small plants it may prove so impracticable and unnecessarily expensive that it cannot be advised—that some of the solids are destroyed.

Septicization, or the action that takes place in a septic tank causes by means of anaerobic (living without air) bacteria the decomposition of sewage and, at its best, changes the organic (vegetable or animal) solid matter into liquid or gases. It has been found by experience that it takes some weeks or even months before bacterial action will thoroughly take place in a new tank. If this is considered a defect it can be overcome in two ways. One way is to add sewage from a septic tank that has been in operation for some time. Another way advocated is to add to the new tank five or six shovelsful of old, well rotted horse manure. By either of these ways bacteria are added to the tank in sufficient numbers to cause septic action to begin.

In a septic tank the starches and sugars (carbohydrates) present in sew-

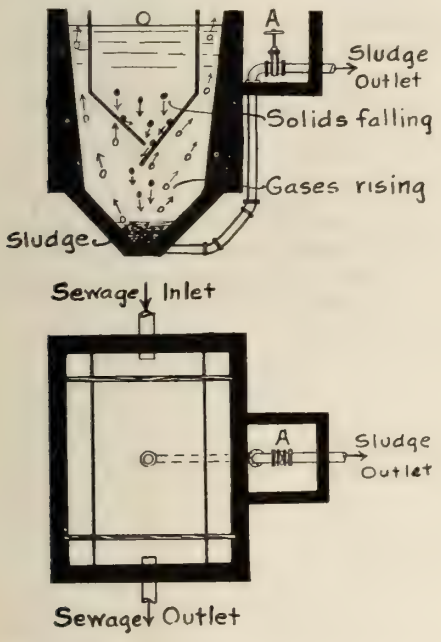


FIG 17—A Modified Imhoff Tank

age are first decomposed. Oils and fats are more slowly decomposed; soap suds and grease are, as in any kind of tank, troublesome and hard to treat.

In Article 3 of this course (see Sanitary Engineer for 15th May) it was shown that under such anaerobic conditions as obtain in a septic tank, many gases are formed. These gases form 1 to 8 per cent. of the volume of sewage treated and may represent an amount of one-half a cubic foot per day per person contributing to the septic tank. About 60 per cent. by volume of such gases are inflammable, the inflammable gases being principally Hydrogen and March Gas. In large plants, under conditions similar to the septic tank, these gases so formed, are actually used for lighting purposes.

On some occasions serious explosions have occurred due to the inflammable gases in septic tanks being accidentally ignited. It cannot, therefore be too strongly emphasized that such tanks should be well ventilated.

The final result of the septic or anaerobic bacterial action is the formation of a fine black sludge in the bottom of the tank. Above this is a clear liquid which, however, is by no means pure; it contains unstable organic matter in solution and the poisons from the bacterial action. A leathery scum possibly several inches thick collects on the surface and, as before mentioned, keeps air from the liquids in the tank, thus insuring only anaerobic bacterial action.

By careful experiments and observations on many plants it has been found that about two-thirds of the solid matters in suspension in sewage are removed by a septic tank. Of this two-thirds about one-half is organic matter and is destroyed by septic action being changed into liquids or gases. Therefore it can be seen that one-third of the solid matters pass through the septic tank, one-third are destroyed and pass off as liquids or gases, and one-third being largely inorganic or mineral matter are left in the septic tank.

Why is it that some operators of septic tanks claim that only clear water passes out of the tank and that there is no increase in deposits in the tank? One result of the fermentation of sewage in the septic tank is to agitate and break up solid matters into very finely divided particles, many of which are of about the same weight by bulk as water. These are carried out with the liquid but would not be noticed in a casual inspection of the "effluent" or the outflow from the tank. If the tank is not cleaned out at certain intervals, fine particles of the sludge from the bottom of the tank will also pass out with the effluent.

The object of a settling tank or a septic tank is to remove the solids from sewage since liquid sewage lends itself much more readily to methods of purification. It has been shown that a septic tank not only removes a large part of the solids but also destroys some portion; further, it does not need such frequent cleaning as a mere settling tank. It should be well noted however that the liquids from a settling tank are not purified or harmless; they will purify and cause a nuisance if exposed to the air. In this connection Gerhard has stated as follows:—

"While the liquid effluents from septic and from cultivation tanks contain but little suspended matter they are highly charged with putrescible matters in solution and the liquid gives off bad odors, particularly on warm or damp days. It cannot be sufficiently emphasized that the septic tank is only a preliminary process of sewage treatment, that the effluents from septic tanks are neither clarified nor purified, that they contain all the organic dissolved matters which are the chief cause of the contamination of lakes and streams, that a further purification is in most cases absolutely required.

In regard to the important matter of bacteria that may pass out of a septic tank not much is actually known. It has been stated that at best the bacteria are only reduced at about the same rate as are the total suspended matters or about one-third of the bacteria in sewage pass out of the tank. As far as known disease germs do not multiply in a septic tank but any bacteria encased in suspended particles may live for quite a time and eventually pass out of the tank still able to spread disease. The fact that the effluent from the tank is full of impurities is an important feature for if not purified this effluent provides a suitable breeding ground for many objectionable bacteria.

The various details of small septic tanks will be fully discussed and illustrated in subsequent articles but there are one or two points that might well be treated in a general way in this artice. They are the size of the tank and how often the tank should be cleaned.

This size of a septic tank has been placed by different writers as that which will hold from 12 to 36 hours flow of sewage. If less than 12 hours retention is had it is pointed out that the result will be that of a mere settling tank. Such a small tank would also naturally need frequent cleaning. If the sewage is retained over 36 hours, what is known as oversepticization takes place. The liquid sewage becomes very stale and hard to treat. About 24 hours retention is probably the best orthodox practice. Plenty of time is given for the solids to settle and the liquid sewage does not become too stale in that time.

How often should a tank be cleaned out? If to be used merely as a settling tank it should as already pointed out be cleaned at least every six weeks, and preferably more frequently than that. If the tank has to be pumped out each time, considerable labor is involved and the disposal of such pumpage may be a serious problem. Ordinarily it can, however, be disposed of in shallow trenches or beds removed at a safe distance from any water supplies. The soil can generally be counted on to safely treat such sewage from the tank

and if necessary a new trench can be used each time.

If the slope of the ground is such that a pipe leading out of bottom of the tank can empty into such trenches a great deal of trouble is avoided. Fig. 16 shows a plan and section of a settling tank (with syphon chamber) similar to one illustrated in a book on "Practical Methods of Sewage Disposal", by Messrs Ogden and Cleveland. There are a number of features of this tank to be commented on in a future article but for the present this tank is reproduced to show the sludge valve and pipe by means of which the solid matters in a tank are easily disposed of.

In a septic tank used for some time there is always the danger of finely divided solid matter passing out of the tank and tending to clog the filters, sub-irrigation tile or whatever is used to finally treat the liquid sewage. This difficulty is largely avoided in the settling tank as the sludge is frequently removed. Combined with the fact that the liquid effluent is fresh and subsequently easily treated or purified, the settling tank is therefore preferred by some to the septic tank.

In many small plants it would be very difficult and expensive to clean out the tanks frequently. How long can such septic tanks safely go without cleaning? A general rule has been given that no more than one-quarter of the contents of a tank should be filled with sludge. With more than that amount of sludge in a tank it ceases to work effectively and too many solids pass out of the tank.

From information available it can be calculated that for each person contributing to a septic tank there will be about one cubic foot of solids per year reaching the tank. On an average one-third of a cubic foot passes through the tank without settling and two-thirds of a cubic foot of solids falls to the bottom of which one-third or at best one-quarter probably remains undestroyed. If say three cubic feet per person is allowed for the size of a septic tank when one-quarter of this space or three-quarters of a cubic foot for every three cubic feet in the tank is occupied with sludge the tank should be cleaned. If the solid matters were compacted in the bottom it would evidently take on this basis three years before the limit prescribed will be reached. But the solid matters are mixed with water, the resultant sludge being much more water than solids. It has consequently been advocated that a tank be cleaned from every [illegible] The greater the amount of water used and consequently the greater the number of cubic feet per person allowed in the tank the longer naturally the periods of necessary cleaning.

In practice many septic tanks are never cleaned: this simply means that the amount of solids passing out of the tank is just about doubled. Even though finely divided this extra amount of solid matter may often be the cause of trouble in subsequent treatment of the liquid sewage. In the case of subsurface tiles they may become clogged on this account and require to be taken up and relaid.

While the matter is not one of particular or economic interest in regard to small plants, it might however be mentioned that a tank combining the best features of both a settling tank and a septic tank has been invented and is being generally used in large plants serving communities. This is the Imhoff or Emscher tank referred to in a previous article. In their book above referred to, Messrs. Ogden and Cleveland have suggested a modification of this Imhoff tank to meet the needs of plants treating the sewage from a number of houses or an institution in which there are 200 people or more. Fig. 17 illustrates the essential features of such a tank.

The fresh sewage flowing between the inner partitions loses a large part of its solids by settling action or sedimentation. The solids fall through the slot to the bottom of the lower compartment. The liquid sewage leaves the tank without coming in contact with the sludge in the bottom of the tank nor is it affected by any gases from the sludge as these gases rise on either side of the partitions. A fresh sewage for subsequent treatment is therefore insured. On the other hand the sludge remains in the tank to be well acted on and reduced by septic action as much as possible. It is easily got out of the tank when required by opening valve A, the pressure of the water above the sludge in the tank forcing it out.

(Continued in next issue)

WATERWORKS AND SEWERAGE SYSTEMS

The above is the title of a splendid book being issued by the Commission of Conservation and written by Leo. D. Denis. It is illustrated with both line drawings, photos, etc., of waterworks, sewage disposal systems and sewers, municipally-owned and otherwise. Just to illustrate the information supplied, we give the following as a sample:

WATERWORKS

TORONTO, York County (500,000 population); in operation since 1841; rebuilt in 1873-78; owned by the municipality.

Supply: Pumped from Lake Ontario, 1¼ miles distant, directly into mains and reservoir; steam and electric power used; average, 7,000 h.p.; maximum, 10,000 h.p.

Purification: Slow sand filtration; mechanical filter in construction.

Reservoir: One of 33 million gallons' capacity; stand pipe of 198,000 gals.' capacity; 915,000 services; lead and iron pipes.

Pressure: Ordinary, 40 to 100 lbs.; fire pressure in commercial centre, 300 lbs.

Consumption: 50,000,000 per day.

Financial: Cost of supply plant, $2,540,590; annual maintenance, $750,765; interest, $476,699; revenue from consumers, $870,065; from public users, $207,127.

Rates: Flat rate, $2 and upwards per dwelling, according to number of rooms; bathroom, $2.75; meter rate, 7½c and 10c per 1,000 gallons. Officer in charge, R. C. Harris, Commissioner of Works.

It also gives the data in connection with the method of sewage disposal in a clear and specific manner. To illustrate this point, we reprint the following:

Toronto Sewage System

Toronto, York County: Total of 480 miles of combined street and domestic sewers, of which 46¾ miles are large ones, ranging from 6½ ft. to 9½ ft. circular, down to 2 ft. x 3 ft. to 2¾ x 4¼ feet egg-shaped (each size and miles are given).

The remaining 433 miles comprise 12-in. to 24-in. tile pipe. Both concrete and brick are used in the construction of these sewers. The sanitary sewers generally have a vitrified wearing surface of either glazed tile or brick.

For sewers carrying storm water only, concrete construction is considered as efficient as any other and cheaper. The sewage is treated by chlorination and in sedimentation tanks.

Cost of disposal plant and trunk sewers in connection with it, $2,792,000.

There are no less than 279 towns and cities dealt with in connection with the sewage disposal plants, and 528 which have water supply systems.

A good plumbing system is more to be desired than a tight roof. You can stuff a rag in the hole in a roof and keep out rain, but you can't do a thing to the bad plumbing system except tear it out and build over again.

NEW ESTABLISHMENT.

J. J. Flynn, who as a lad left Thorold over twenty years ago for Erie (Pa.), where he learned the plumbing trade, and who has conducted a successful business at Port Clinton (Ohio), since then, has now returned to Thorold, and has leased the middle store in the Batten block, recently vacated by Batten Bros., and is filling it with a full stock of supplies necessary for his business, intending to open up in his native town. He comes backed up with a long city experience, and prepared and well qualified to meet all demands.

20 YEARS AGO.

Mr. C. M. Robertson, secretary-treasurer of the James Robertson Company, was on Wednesday married to Miss West, of Toronto. After the ceremony and reception at the bride's residence the bridal party left on an American tour. Hardware and Metal begs to tender its congratulations.''

To-day.

Mr. Robertson is now president of the James Robertson Company, having been appointed to that position some five years ago. His headquarters are at Montreal. Mr. and Mrs. Robertson continue to enjoy good health.—Editor.

STEEL AND RADIATION CO. MAKE GOOD STATEMENT.

The annual report of Steel and Radiation, Limited, for the fiscal year ended December 31 last shows profits of $187,979, against $70,692 in 1914, $162,421 in 1913 and $124,455 in 1912. After interest of $64,893 on bonds, etc., net profit was $123,086, against $13,797 in 1914 and $108,131 in 1913. Appropriations were $78,990 for proportion of discount on bond issue, loss on sale of investment, etc., leaving, after adding in the profit and loss surplus from last year, a credit balance of $136,800.

A SPLENDID MOVE.

A plan is on foot in Windsor, sponsored by several prominent business men and building contractors, to erect one thousand dwelling houses in the southern part of the city, wherein to accommodate some of the hundreds of families now unable to secure houses in Detroit. For months the Detroit Board of Commerce has been trying to arrange for something of this kind, but as yet the demand far outstrips the supply of suitable dwellings. A majority of these families, it is definitely known, are quite self-supporting, and would make desirable citizens, hence the anxiety of the local promoters to get the work of construction under way at once.

PUGILIST ENLISTS.

The call of the motherland in these days of sorrow and bloodshed is being felt more and more as the war wages. Her sons from all over are responding. Thousands from the United States leave the home of their adoption every week.

Born in Dutton, Ontario, 29 years ago, leaving Canada at the age of 4, George Shore, better known as ''Reddie,'' champion bantam weight in Canada and State of Michigan, recently came over and enlisted for active service in the Canadian Mounted Rifles at Hamilton. George Shore learned his trade as steam and hot water fitter in Detroit and is not only an enthusiastic athlete, but also takes a great interest in his daily calling. The writer was agreeably pleased at the way George was able to discuss the various technical problems in the heating trade. He has had considerable experience in the covering of heating plants, some of the largest equipments in America bearing testimony to some of his work, and in connection with covering of heating plants Mr. Shore stated: ''It is not the amount of heat that is generated in a plant, but rather the amount which actually reaches the radiator which makes up a practical and effective heating system.'' It is with no small degree of pride that the Sanitary Engineer welcomes George Shore back to the land of his birth. Hoping that after the war is over he will find in Canada every opportunity he can wish to labor at his regular occupation.

IMPORTANT NOTICE

Cheap Rates

Special rates have been procured for those who wish to join the Toronto Society party to the London convention. The party leave C.P.R. Station at 8 a.m. Monday. The return fare is $4.60. Those desiring to join and take advantage of this very low rate should communicate with Secretary Frankland, 1093 Bathurst St., Phones Hillcrest 2022 or at 22 College St., Phone North 1879.

ANNUAL CONVENTION

Those in attendance at the 21st annual convention in London will get some practical experience re the daylight saving scheme. London has adopted this scheme, which without doubt shows that that city does not by any means intend to be one of the back number cities, like Toronto, for instance.

Toronto, the Queen City (title assumed) must be always in the rear. It would be refreshing to see where Toronto has ever really led. She's a follower, like most of her people. The writer does not wish to knock his home town, but hopes to do his bit in trying to wake her up. She's the Queen City, no doubt, but sleepeth.

TORONTO AND DRY-SWEEPING

It is appropriate at this time to direct the attention of the public to the following provisions of By-law No. 7533:

The occupant of every house, shop or other building shall water and cleanly sweep the sidewalk fronting or abutting on such building before eight o'clock in the morning of each day during the summer months.

The dry sweeping of any shop, store or other building, and the dry sweeping of any sidewalk in front of or adjoining such building is prohibited by by-law.

Any person convicted of a breach of either of these sections is liable to a penalty not exceeding $50, besides costs.

TORONTO SOCIETY NEWS

The first baseball match was—well we won't say what it was, we beg to apologize for calling it a baseball match. It was something base anyway. Partly because the weather man got his first innings with ''wet goods'' and partly be-

cause he pretty nearly had the whole field to himself. However the club reporter declares that West End beat East End but he did not get the score, being too busy dodging the wet drops of water in his haste to make a get away. However there is at least some consolation in that good old proverb that "a bad beginning makes a good ending". Let-soap-so anyway.

SELL HEALTH INSURANCE

Thousands of people take out insurance on their property, take out life insurance and feel they are doing a wise thing. No doubt they are.

But how many think when accepting the lowest tender, which without doubt means also that they are going to get the poorest installation, that they are contributing to the possibilities of ill-health?

Every sanitary engineer who insists upon installing the very best goods, employing the best and most skilled workman and demands his price, is not only selling the best merchandise, but also selling health insurance with a free paid-up policy. Statistics state that there is an average of 400,000 cases of typhoid fever annually in the United States. How much of this is due to defective plumbing? We venture to say a pretty large percentage. As matters stand, adequate plumbing inspection, an up-to-date plumbing code and the use of the more modern fixtures are badly needed in most localities, not only in the United States, but Canada too, and the man who is only too ready to cut on price cannot help, if he remains long in business, but contribute considerably to insanitary conditions, disease and death, not life insurance.

Don't, therefore, reader, be in the latter class; sell health insurance, plus a long business existence and quality plumbing installations.

PRICES ON STAPLE LINES

BOILERS (Range)

30-gal. Standard, welded	$8 00
30-gal. Standard, riveted	8 25
30-gal. extra-heavy	11 50

OAKUM	Per 100 lbs.
Best (American)	17 25
U.S. Navy (American)	16 50
New hemp (English)	12 50
U.S. Navy (English)	12 00
Plumbers (spun)	8 00

SOLDER, BAR	
Guaranteed	0 31
Strictly	0 29
Commercial	0 26¾

SOLDER, WIPING	
Star extra	0 28½
Easy	0 26½
Acme	0 25½

VALVES, ETC.

Ground work, 56 p.c.
Stand, compr. work, 65 p.c.
High grade compr. work, 59 p.c.
Cushion work, 50 p.c.
Fuller work, bibs, 58 p.c.; No. 0 basin cocks, 58 p.c.; and 1 and 2 basin cocks, 53 p.c.; bath cocks, 64 p.c.
Flatway stop and stop and waste cocks, 60 p.c.; roundway, 60 p.c.
J.M.T. Globe, Angle and Check Valves, 35 p.c.; Standard, 45 p.c.
J.M.T. Radiator Valves, 50 p.c. Standard, 57½; patent quick opening valves, 70 p.c.

GASOLINE	Montreal
Barrels	0 23
Drums	0 30
Tank wagon	0 29½

	Toronto
Any quantity, in bbls.	32
Drums, 40-gal., per gal.	29
Tank wagon	28½

PIPE, STANDARD WROUGHT

In effect April 26, 1916

Buttweld	Per 100 feet Black	Galv.
⅛ in.	$ 3 00	$ 4 50
¼ and ⅜ in.	3 06	5 43
½ in.	3 91	6 08
¾ in.	4 72	7 65
1 in.	6 97	11 31
1¼ in.	9 43	15 30
1½ in.	11 28	18 29
2 in.	15 17	24 61
2½ in.	23 99	38 90
3 in.	31 37	50 87
3½ in.	37 72	61 18
4 in.	44 69	72 49

Lapweld		
2 in.	17 02	26 46
2½ in.	25 16	40 07
3 in.	32 90	52 40
3½ in.	39 56	63 02
4 in.	46 87	74 67
4½ in.	57 15	90 81
5 in.	66 60	105 82
6 in.	86 40	137 28
7 in.	116 62	179 70
8 in. x 25 lbs. per ft.	122 50	188 75
8 in. x 25 lbs. per ft.	141 12	217 44
9 in.	169 05	260 48
10 in. x 32 lbs. per ft.	156 80	241 60
10 in. x 40 lbs. per ft.	201 88	311 06

Prices Ontario, Quebec and Maritime Provinces.

PIPE (LEAD)

Lead pipe, $14 net.
Lead waste pipe, $15 net.
Traps and bends, 5 p.c. off.

PIPE (SOIL)

Medium and extra heavy pipe up to 6-inch, 65 p.c.
8-inch, 45 p.c. off.
Winnipeg prices.

GALVANIZED IRON PIPE

¼ inch, $6.45; ⅜, $6.55; ½, $7.35; ¾, $9.28; 1, $13.72; 1¼, $17.73; 1½, $21.20; 2, $28.55; 2½, $47.15; 3, $61.65.

IRON PIPE

Black, ¼, $3.70; ⅜, $3.78; ½, $4.87; ¾, $5.92; 1, $8.75; 1¼, $11.20; 1½, $13.50; 2, $18.18; 2½, $30; 3, $39.25; 3½, $47.25; 4, $56; 4½, $68.78; 5, $80.10; 6, $103.95.

Above prices on pipe under revision; advance will be about 5 p.c.

OLD MATERIALS

Tea lead, pack, 5¾c lb.
Tea lead, chest, 5¾c lb.
Lead (heavy), pipe, etc., $6.
Brass, heavy, 15¼c lb.
Brass, light, 12c lb.
Zinc, heavy, 12½c lb.
Copper, heavy, 20¾c lb.
Old cast iron, $14.75 per ton.
Wrought iron, No. 1, $18.75 ton.
Wrought iron, No. 2, $10.50 ton.
Stove plate, $10.50 per ton.
Mach. compos., No. 1, 16c lb.
Compos. turnings, No. 1, 13¾c lb.

Rubbers such as old rubber boots and shoes, according to trim, 7c to 8c lb.; overshoes, lumbermen's rubber boots, etc., 5 to 6c lb.; auto tires, etc., 4½c.; bicycle tires, 2½c.

LONDON CRITICIZED BY PROVINCIAL HEALTH BOARD

The Provincial Board of Health has registered its annual complaint with the city in regard to London's sewage disposal. The grievance is stated this time in more severe terms than usual, and trouble is intimated to be in store for the city if it does not comply with the board's demands. Two years ago, it alleges, it asked the city engineer for information, and that while the letter was acknowledged, no effort was made to furnish the data. London is just now completing a quarter-million-dollar storm-sewer system, and this comes in for the Provincial Board's criticism. The city could have remedied the rain-water [illegible] On the other hand, its sewage-disposal system is so defective that 70 per cent. of the [illegible] is emptied into the river, polluting it.—Toronto Globe.

Sixty Other Towns in Ontario Polluting Waters in the Province

Commenting upon the above, it would be interesting to know what the Ontario Provincial Board of Health is doing towards making other cities comply with the law regarding the pollution of lakes, rivers, and streams of Ontario.

Out of 95 towns in Ontario that have sewers, only 35 treat the raw sewage.

The City of Ottawa, with a population of 101,795, uses 94½ miles of sewers, outlets of which empty into the Rivers Ottawa and Rideau.

The combined mileage of sewers of the other 59 towns and cities in Ontario which empty into some public waterways amount to miles. It seems as if the task is too great for the Ontario Provincial Board of Health, and that instead of our Federal Government allowing upstart members to rake up a lot of mud at a time when our military department is doing its level best to end this war, it would look better if these civil members of Parliament would get down to brass tacks and clean the filthy conditions prevailing.

Sixty Ontario towns and cities breaking a health law, and little said, at least nothing done.

No doubt London could do a lot better, and certainly should obey the law. But how many cities are there in Ontario that deserve the credit that London does for works done of a public nature?—Editor.

TENDER AWARDED

Hamilton & Scott, Sanitary and Heating Engineers, St. Thomas, have been awarded the contract to install the necessary plumbing in the Nurse's home in connection with the Amasa Wood Hospital.

It would be interesting to know just how the firms tendering on this job ar-

rived at their figures, prices ranging from $118.15 to $135.00 were submitted. There should not be such a big difference on such a small contract providing, of course, that the specifications were properly and definitely drawn up in a clear manner.

EDITOR.

TORONTO GLOBE'S QUERY

(Continued from page 17.)

multiplication of that type of creature of which it has been written that the

Big ones have little ones upon their backs to bite 'em,
And little ones have lesser ones and so ad infinitum.

Any steps, therefore, which would tend to eliminate the existence of such conditions from our midst we should regard as well worthy of consideration. Whether the registration of paperhangers would have this much to be desired effect we are not at the moment prepared to say, but we certainly admit that we have always maintained that an official inspection should be made of all empty houses previous to the entry of a new tenant, a step somewhat in the same direction as that which is exercising the mind of our friend, the Globe.

A few years ago it occurred to some medical men in France to gather statistics with regard to the houses occupied by the victims of tuberculosis, and it was found that, in something like 75 per cent. of some 2,000 cases which were investigated, the victims had inhabited houses of which the previous tenants had been victims of this fell disease. Surely this, as the French would say, "gives one to think!" How many cases of sickness and disease may not be due to insanitary conditions which might have been obviated, had a proper inspection of the patient's home been made previous to his entering it?

Many a true word is spoken in jest, and though in the paragraph quoted above we do not suppose the writer had any idea more serious than an endeavor to "pull our leg," in which attempt he appears to have grabbed his own leg in mistake for ours, the thoughts given rise to by his query, seemingly made in jest, are not after all to be lightly passed over.

OVERHEAD EXPENSE

Editor The Sanitary Engineer:

Your article on overhead expense which appeared in the April 1st issue, is one of the best the writer has seen on this subject.

If it could only be established in the minds of our friends that they have an overhead expenditure and that it is necessary to include it in the estimates before a profit can be made, a great deal would have been accomplished.

Your scheme of the 100 squares should make this point clear to all who study it.

Yours truly,
W. CUNNINGHAM,
Sales Manager,
The James Robertson Co., Toronto.

SEND IT IN

"If you have a bit of news,
Send it in.
Or a joke that will amuse,
Send it in.
A story that is true,
An incident that's new,
We want to hear from you!
Send it in.
Will your story make us laugh?
Send it in.
Send along a photograph,
Send it in.
Never mind about your style,
If it's only worth the while,
And will make a reader smile,
Send it in."

—Creditmen's Journal.

UNITY AND CO-OPERATION IS STRENGTH.

THE Toronto employers and employees came to an agreement re matters of vital interest to both. The following is a copy of agreement arrived at by both parties.

ARTICLES OF AGREEMENT mutually made and entered into between the Toronto Society of Domestic Sanitary and Heating Engineers, as parties of the first part, and Local Union 46 of the United Association of Plumbers and Steamfitters of the United States and Canada, as parties of the second part. With a view to promoting the business of heating and sanitation, to organize those persons who are qualified therein, in order to allow these trades to insure a standard of efficiency for the protection of the public, and for the persons engaged in such business, by the establishment and maintaining of fair conditions, and settling of differences that may arise between the members of the respective organizations parties to this agreement, and to maintain industrial peace.

Clause 1. The hours of labor shall be from 8 a.m. to 5 p.m. with one hour for lunch for five days, and on Saturdays from 8 a.m. to 12 noon.

Clause 2. The mininmum rate of wages for all journeymen shall be 47½ cents per hour for the first year, and 50 cents per hour for the second year.

Clause 3. All overtime shall be paid at the rate of time and one-half, except Sundays and the following holidays, which shall be paid or at the rate of double time: New Year's Day, Good Friday, Victoria Day, Dominion Day, Civic Holiday, Labor Day, Thanksgiving Day, and Christmas Day.

In cases of absolutely necessary repairs in which damage is liable to be done, and finishing up a repair job on regular working days, if such work will not take more than one hour's time, it shall be done at the regular rate of wages.

Clause 4. Men working out of Toronto shall have their fare and board paid. Time travelling to and from such work shall be paid at the rate of single time only up till 9 p.m. If travelling at night a sleeper to be provided. In localities where no Local Union of the U.A. exists, the hours of labor may be extended to 10 hours on regular working days at the rate of single time.

Clause 5. The parties of the first part agree to use their efforts to the end that all plumbers and steamfitters in their employ at present or those to be employed in the future (during the period of this agreement) shall be members of the United Association.

Clause 6. All apprentices shall serve their apprenticeship continuously in one shop, unless otherwise agreed upon, and shall pass a satisfactory examination as herein provided for, before a joint examining board, mutually agreed upon by the parties to this agreement.

An apprentice when deeming himself competent to use the tools, shall apply to the joint examining board through his employer for examination, and if successful he shall be permitted to work with the tools for the employer making the application, for a period of two years, and shall not receive less than 25 cents per hour in the first year, and 35 cents per hour in the second year. After that time he shall receive the minimum rate of wages according to this agreement.

Should the applicant after passing the examination leave the employer who has made the application, he shall not be recognized by the parties to this agreement as other than a journeyman, and shall only be employed as such.

No more than one apprentice from each shop can apply for this examination during any one year, unless, where there are more than 5 journeymen employed, when they can make application for one apprentice for 5 journeymen regularly employed.

If an applicant fails to pass the examination he must return to work helping for six months, after which period he may again apply for examination.

Clause 7. Each steamfitter will be allowed one apprentice only.

Any additional help that may be required to be laborers who shall not be classed with steamfitters' apprentices or plumbers' apprentices, and will not be permitted to handle the tools of the trade.

Clause 8. In case of any grievance arising between the parties to this agreement, which cannot be adjusted by the representatives of both organizations, it shall be referred to a joint arbitration board, composed of 3 masters and 3 journeymen, mutually agreed upon, said board shall meet within 48 hours and shall have full power to settle such grievance, and appoint an arbitrator if necessary.

Clause 9. In the event of a dispute arising which cannot be settled satisfactorily by the joint arbitration board, or any violation of the clauses of this agreement by Local Union 46, that before any definite action is taken the matter must be referred to the general office of the United Association and no strike or lockout shall take place until an officer of the said Association has investigated the matter and rendered a decision.

Clause 10. This agreement shall become effective July 1st, 1916, and remain in force until June 30th, 1918, and should either party wish to change, add or amend the above Agreement, they shall give at least one (1) month's notice in writing prior to the termination of this Agreement with the proposed changes attached. Providing no such notice is given by either party one (1) month prior to July 1st, 1918, this Agreement to remain in force from year to year until such notice is given as herein provided. When such notice has been served it shall be the duty of the Joint Committee to convene within thirty days and come to a decision.

Signed in the city of Toronto, June 9th, 1916, on behalf of

Toronto Society of Domestic Sanitary and Heating Engineers.
GARRETT F. FRANKLAND, Secretary.

Local Union 46 United Association of Plumbers and Steamfitters.
T. MOSSES, Secretary.

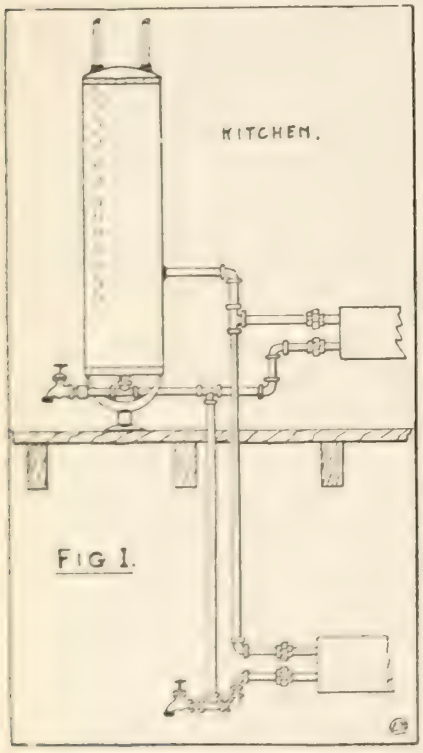
The United Association of Plumbers and Steamfitters of the United States and Canada,
JOHN W. BRUCE, General Organizer.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

SYPHONS FOR SEPTIC TANKS.

W. H. Tamblyn & Sons, Brantford, Ont.—Will you kindly advise us as to the manufacturers of syphons for septic tanks?

West Toronto Foundry Co., West Toronto, Ont.; Anthes Foundry Co., Ltd., Toronto and Winnipeg; James Robertson Co., Toronto, Ont.—Editor.

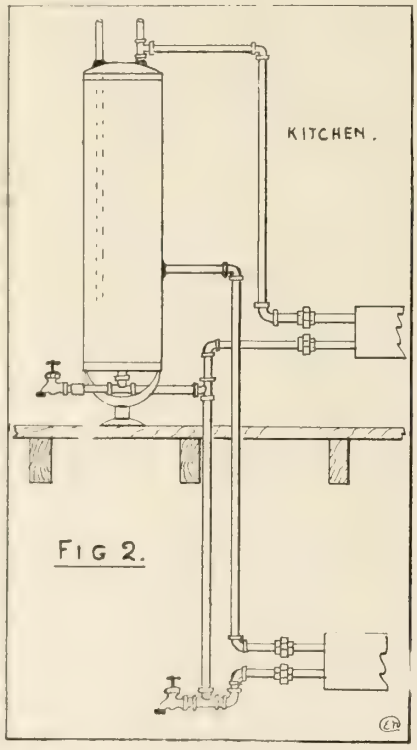


RANGE BOILER CONNECTIONS

Editor, The Sanitary Engineer,—

I have installed several range boilers in some new houses being built. The contract for plumbing called for a range boiler in the kitchen. The owner has furnished three ranges for the basement and is going to live in one of the houses himself, he wants the ranges all connected up with the boiler as well as ranges in the kitchen, one of the houses require a gas water heater connecting up as well. Would you kindly show a number of suggestions how this work could be done so as to be sure of getting plenty of hot water when either, all or one of the fixtures are in use.

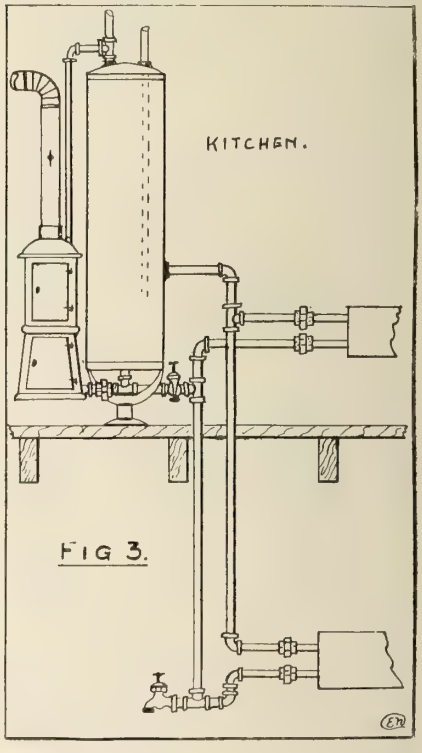
A. N. R.



The accompanying sketches Fig. 1, 2 and 3 show how these ranges and gas water heater may be connected up, they are somewhat unusual in one particular, that of the return or lower pipe at the basement range. It will be seen that a trap is formed, the purpose for this trap is so that by drawing water off at the trap provided, all sediment, rust, etc., can be drawn off. This trap it will be noted is so made as to drain all the fixtures.

Fig. 1 shows the ordinary method of using the side connection on the boiler, and while being a very commendable installation, giving a large volume of hot water, it will not give a small quantity of hot water quite so quickly as Fig. 2, that is when the kitchen range is burning. Fig. 3 shows a similar connection to Fig. 1 except that the gas water heater is attached. In this connection, however, it must be noted that the cold water supply to boiler has been changed from the left side to the right, this very often dispensed with using a number of extra fittings. Pipes should all be reamed and none but metal to metal unions used.

EDITOR.



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Editor, The Sanitary Engineer,—

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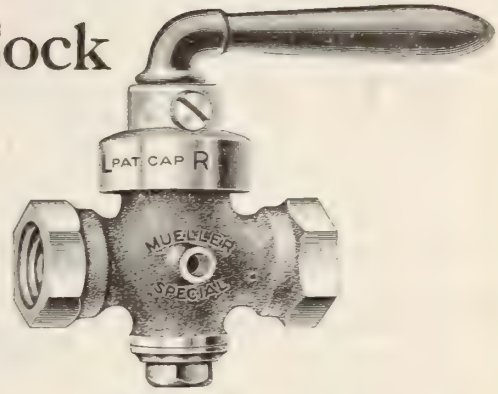
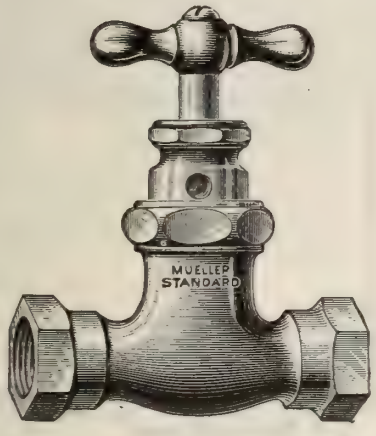
Ground Key Work

Made for Iron, or Lead Pipe as well as Lead and Iron. Heavy Pattern with free, clear water ways. Smooth working.



Mueller Compression Stop Waste Cock



Made of high copper bearing Bronze—nothing but virgin metal used.

Encased seated washers of the highest grade.

Perfectly fitted threads throughout.

All parts interchangeable.

Pressure is not open to waste when being turned on or off.

It is greatly to your interest to use only the very best in stop and waste cocks.

Poor stop and waste cocks have cost more to the consumer as well as the trade than any other piece of brass goods used in the sanitary and heating business.

A stop and waste cock that fails to act in case of emergency may cause serious damage to your customer's home and your reputation.

Mueller Stop and Waste Cocks are positively reliable. Whether they are operated often or once in months or years, they are ready to act efficiently.

Once operated may be worth several times the first cost.

Nearly 60 years' experience, supreme efforts to produce only the best in brass goods and our unconditional guarantee stands behind these and all other Mueller lines.

Write for complete catalog.

H. Mueller Mfg. Company, Limited

SARNIA, ONTARIO

Makers of High-grade Water, Plumbing and Gas Brass Goods.

business in a moving picture theatre, as well as the approximate cost of same.

T. H. Ehrhardt.
Box 50, Sackville, N.B.

These slides can be procured from C. Potter, 191 Yonge street, Toronto.

They are made 3¼ x 4 inch, suitable for use in any moving picture lantern. Prices range from 40c to $1.25 each according to nature of requirement. If a picture or card be produced, it may simply be copied and the price be about 40c.

But if a show card (the better way) has to be designed and written as a preliminary. Then the slide will cost $1.00 or colored $1.25 all subsequent slides will cost less: say from 25c to 50c.

EDITOR.

BOILERS AND ENGINEERS

Mr. Louis Guyon, Inspector of Industrial Establishments, Gives Views

Mr. Louis Guyon, chief inspector of industrial establishments and public buildings for the province, writes in regard to boiler inspection and accidents in Montreal:—

From the year 1888 to 1913, that is a period of 25 years, we have had about 75 fatal accidents and 80 unfatal ones in the province of Quebec including Montreal, according to the reports transmitted to the Factory Inspection Department by steam users. A proportion of these were attributable to over-heated cast iron boilers used for heating purposes, but quite a few fatal accidents were caused by explosion in plants like the Light, Heat & Power Co., etc. Serious as these figures may appear, they are far below the statistics given by many States bureaus and considerably smaller than those furnished by our neighbors in Ontario, due allowance being made, of course, for the greater number of boilers in that province.

The boilers in our province are inspected yearly by provincial Government inspectors, and also by qualified inspectors representing insurance companies, and the same system prevails in the city under the municipal inspectors' control, so that rigid inspection and close surveillance by Government factory inspectors will largely account for the situation.

In regard to the Stationary Engineers' Act of the province, Mr. Guyon says:

"The engineers of the city of Montreal have not been slow in realizing the advantages of a fair and open examination, and a system destined to give them in the future a proper standing in the other provinces. The only objection raised by the Engineers was the very legitimate one of having to pay two fees. During the last session, the provincial Government amended the act and abolished municipal examination in the province, including Montreal. The aim of provincial legislation is to gradually connect our examination bureau with the technical schools in view of training and elevating the coming engineer to higher proficiency. In shouldering this burden the Government will not make any money, as 75 per cent. of the annual renewal fees will not exceed 50c per capita, so that this invasion of municipal rights is not very serious.

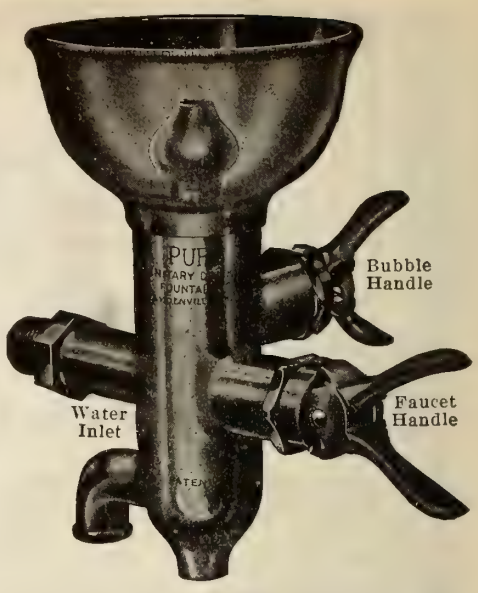
"Referring to the 2,000 engineers the Municipal Inspector claims to be against Government examination, I would invite any interested in this matter to examine records of the bureau, and they will find that over 1,500 engineers have already been examined and that organized labor and steam users at large are in thorough accord with the Government measure."

PRACTICAL COURSE FOR SHEET METAL WORKERS.

(Continued from page 22.)

joining B 9. With B as a centre and B C on plan as a radius, draw an arc. With X 9 at angles and C as a radius and point 9 on pattern as a centre, draw an arc, cutting one drawn from B, thus obtaining point C. Now draw a line joining B C and C 9. With C on pattern as a centre and X 10, X 11, X 12, and X 13 at angle C as radii, draw arcs, intersecting each as drawn with arc drawn from last obtained point, these arcs to have a radius of one division of top circle. When point 13 is obtained, draw line joining C 13. With C on pattern as a centre and C D on plan as a radius, draw an arc. With X 13 at angles at D as a centre and point 13 on pattern as a centre, draw an arc, intersecting the one from C, thus obtaining point D.

Draw lines D 13 and D C. With D on pattern as a centre and X 14, X 15, X 16, and X 1 at angles at D as radii, draw arcs, intersecting each as drawn with arc from last obtained point. These arcs to have a radius equal to one division of top circle. When point 1 is obtained, draw a line joining D 1. With D on pattern as a centre and D E on plan as a radius draw an arc. With E 1 as a base and A or E X as altitude, obtain line X 1, equal to X 4 as starting line. With this distance X 1 as a radius and point 1 last obtained as a centre, draw an arc, intersecting arc drawn from D, obtaining point E; then draw lines joining D E and E 1. The outline, E D C B A E, 1 2 3 4, etc., to 1, forms complete pattern of flaring article shown in plan and elevation.



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The old-time faucet is costly. Running hour after hour, day after day, its ceaseless flow is costing you money, yet without any better service.

Puro Saves 35%

A Puro Sanitary Drinking Fountain will cut that water bill 35%. We can prove that it has done that for others.

It will give every employee a safe, saner draught of bubbling water free from the contamination of the common drinking cup.

In a word, it is the only sanitary Drinking Fountain that is really safe, sanitary, simple, automatic in control, and easy to attach.

"PURO-FY"

(MADE IN CANADA)
YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company
147 University Ave., Toronto, Canada

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They are renewable disc valves, with heavy bodies, spindles and valves, and fitted with gland follower in packing nut.

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Full information and prices furnished upon request.

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Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

Your orders will have prompt and careful attention, not sometimes—but all the time.

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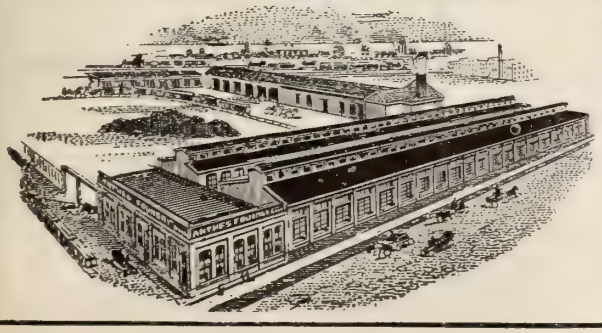

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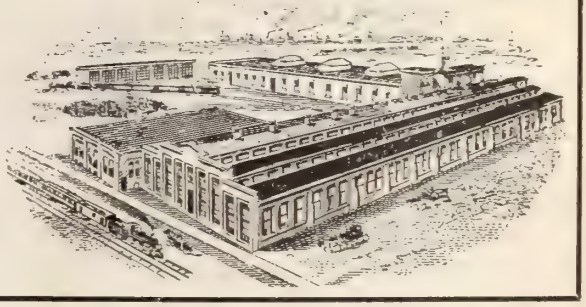

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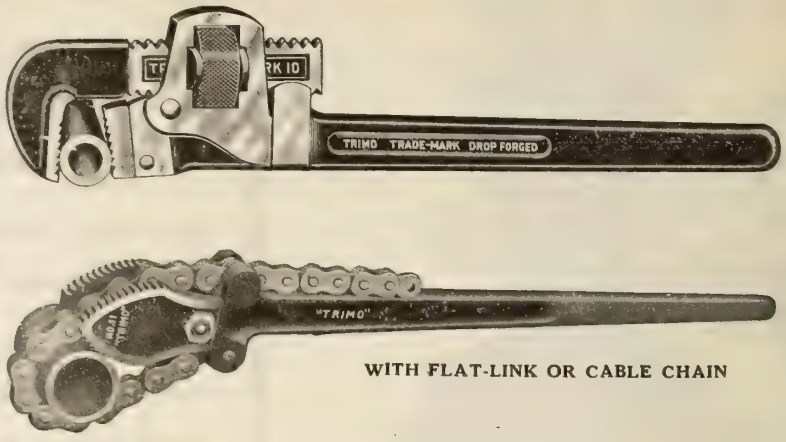

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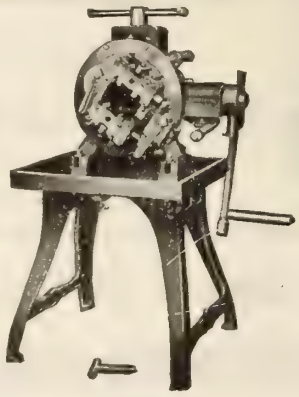

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American or Whitworth Threads.
Using the genuine Armstrong Dies.
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We need a man in your home town to represent us, and for that **service**, his earnings will be liberal. That, we will tell you all about when you write us.

Do so to-day—next week every minute of your spare time will count for you in cash.

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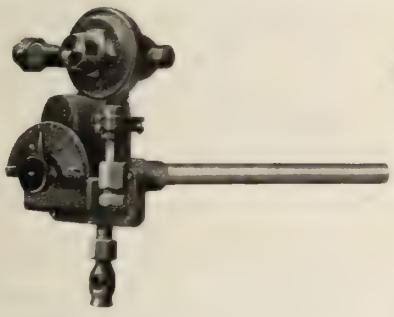
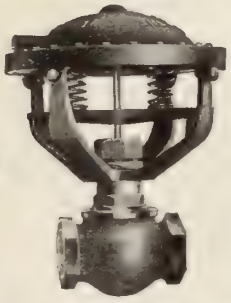


Regulator



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SIMPLE, DURABLE and RELIABLE

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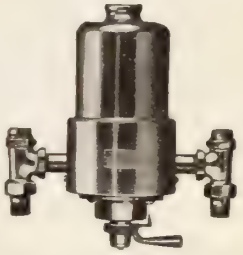

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Wabash, Indiana

Classified Buyers Guide

Occasionally advertisements are inserted in the paper after this page has gone to press. The insertion of the Advertiser's name on this page is not part of the advertising order, but is inserted solely for the convenience of the reader of the paper

Air Line Systems.
C. A. Dunham Co., Ltd., Toronto.

Air Valves.
Canadian Wolverine Co., Ltd., Chatham.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
C. A. Dunham Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
Kerr Engine Co., Ltd., Walkerville.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.

Asbestos Goods.
James Morrison Brass Mfg. Co., Toronto.

Boilers, Steam or Hot Water.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Boiler Feed Regulators.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Brass Goods, Valves, etc.
Canadian Wolverine Co., Ltd., Chatham.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Jenkins Bros., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Brass Pipe and Tube.
Canada Metal Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Bubblers.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.

Cellar Drainers.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Chain Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Closets.
Amherst Foundry Co., Amherst, N.S.
B. O. T. Manufacturing Co., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Consulting Engineers.
H. L. Seymour, Toronto.

Control Residence Equipments.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Ltd., Sarnia, Ont.
Co., Limited, Toronto.
& Pump Co., Toronto.

Drainage Regulators.
Ltd., Montreal.
Ltd., Toronto.

Drainage Fittings.
West Toronto.

Drinking Fountains.

Ejectors, Steam.

Ejectors for Sewage.
Equipment Co., Ltd., Toronto.

Engineers.

H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.
Standard Ideal Mfg. Co., Ltd., Port Hope.

Electric Pumping Machinery.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Faucets.
Canada Metal Co., Ltd., Toronto.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.

Fittings.
Canada Metal Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Flushometers.
Canada Metal Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Floor and Ceiling Plates.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
Canada Metal Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
James Morrison Brass Mfg. Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Gasoline Engines.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Gas Water Heaters.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Generators.
W. E. Clark & Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.

Heaters.
Darling Bros., Ltd., Montreal.
Lord & Burnham Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Lead.
Canada Metal Co., Ltd., Toronto.
Hoyt Metal Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Mixing Valves.
Canada Metal Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Co., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Monkey Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Oil Storage Systems.
National Equipment Co., Ltd., Toronto.

Packing.
Canadian Wolverine Co., Ltd., Chatham.

Packless Radiator Valves
W. E. Clark & Co., Toronto.
Kerr Engine Works, Walkerville.

Pipe and Radiator Hangers.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.

Pipe, Black and Galvanized.
Canadian Tube & Iron Co., Ltd., Montreal.
Lord & Burnham Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Warden King, Ltd., Montreal.

Pipe Cutters.
Trimont Mfg. Co., Roxbury, Mass.

Pipe Joint Compounds.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

Pipe, Soil, and Fittings.
Anthes Foundry Co., Toronto and Winnipeg.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Warden King, Ltd., Montreal.

Pipe Threading Tools and Machinery.
Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.
A. B. Jardine & Co., Hespeler.

Pipe Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Porcelain Ware.
Canada Metal Co., Ltd., Toronto.
Amherst Foundry Co., Amherst, N.S.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Pumps.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Radiators.
Lord & Burnham Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.

Radiator Traps (Steam).
Canada Metal Co., Ltd., Toronto.
W. E. Clark & Co., Ltd., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Reducing Pressure Valves.
Canada Metal Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Septic Tank Valves and Syphons.
Anthes Foundry Co., Ltd., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
West Toronto Foundry Co., West Toronto.

Solder.
Canada Metal Co., Ltd., Toronto.
Hoyt Metal Co., Toronto.

Steam Specialties.
W. E. Clark & Co., Ltd., Toronto.
Darling Bros., Ltd., Montreal.
Dart Union Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville, Ont.

Steam Traps.
Canadian Morehead Co., Ltd., Woodstock.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Smoke Test Machines.
James Morrison Brass Mfg. Co., Toronto.

Tanks, Steel and Wood
Ontario Wind Engine & Pump Co., Toronto.

Temperature Boosters
W. E. Clark & Co., Toronto.

Testing Plugs.
James Morrison Brass Mfg. Co., Toronto.

Tools.
Armstrong Mfg. Co., Bridgeport, Conn.
Canadian Wolverine Co., Ltd., Chatham.
Hall & Sons, Ltd., Brantford.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Nicholson File Co., Port Hope, Ont.
Williams, J. H., & Co., Brooklyn, N.Y.

Unions.
Canada Metal Co., Ltd., Toronto.
Dart Union Co., Ltd., Toronto.

Vapor Heating Systems.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
W. E. Clark & Co., Ltd., Toronto.

Vitro Tanks
Cluff Mfg. Co., Toronto.

Vacuum Systems of Heating.
W. E. Clark & Co., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Water Supply Systems.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Darling Bros., Ltd., Montreal.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

ON YOUR NEXT HEATING CONTRACT, SPECIFY

KING Hot Water Boiler and Radiators

Your customers will be grateful for the superior results the King Boiler gives, and it will insure their continued confidence in your goods and service. If we can assist in solving any local heating problem for you, please ask us.

STEEL AND RADIATION, LIMITED

FRASER AVENUE, TORONTO

Branches: MONTREAL, QUEBEC

ALPHABETICAL LIST OF ADVERTISERS

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Since It's Only a Handful

Williams' "VULCAN" Chain Pipe Vise

Why leave it behind?

Before you return you may need to turn a thread, make a bend, cut off an end or perform any of the other ordinary operations for which a plumber is usually summoned.

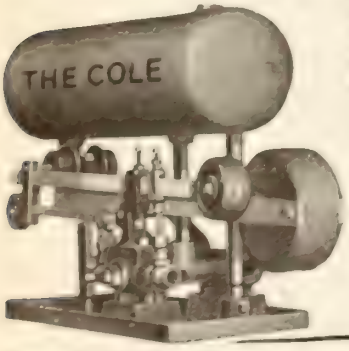
Better go *prepared* and clinch a life-long customer on your first visit.

3 sizes. Capacities ⅛ to 8 in. pipe

J. H. WILLIAMS & CO.
77 RICHARDS STREET BROOKLYN, N.Y. CITY
THE WRENCH PEOPLE

Western Office and Warehouse:
40 SO. CLINTON STREET CHICAGO, ILL.

COLE DIRECT RETURN TRAPS



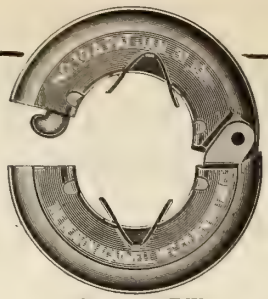
Are big fuel savers because they operate on 1-10th the steam that it takes to run a steam pump.

They work with the utmost in efficiency and reliability, and return condensation at any pressure.

Operate on roller bearings, on a fixed Fulcrum which permits of full discharge at each operation.

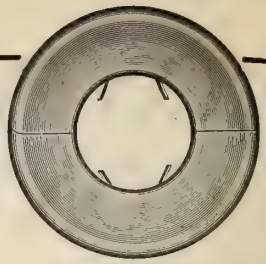
Mr. Steamfitter, why not get in touch with US?

GEO. W. COLE CO.
838 Dundas St., TORONTO



OPEN VIEW NO. 10-A.

The CEILING PLATE that's better



TOP VIEW NO. 10-A.

THE NO. 10—A NARROW FLANGE PLATE IS A STEEL HINGED PLATE. FLANGES ¾" WIDE. HIGHLY FINISHED. ESPECIALLY DESIGNED FOR TWIN CONNECTION "NARROW."

Gem No. 4.

The split ceiling plate is coming more and more into use than ever and ALWAYS GIVES A NICE FINISH, because it can be attached to mains and risers at the very last, and is not exposed during completion of a building on the floors.

High quality at the right price

Gem No. 4 Automatic Air Valve

Made from the best brass obtainable. Pressed shell and pressed brass base which eliminate danger from blowholes, which is a fault with cast bases.

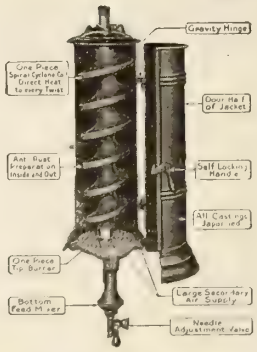
Write for catalog showing our complete line of specialties.

The BEATON & CADWELL MANUFACTURING Co.

New Britain, Conn.

Eastern Agent: J. R. Devereux & Co., 233 St. James Street, Montreal. Western Agent: A. E. Hinds & Co., Chamber of Commerce, Winnipeg.

The Hotstream HEATER WORKS TRADE MARK REG. WATER HEATER


Gravity Hinge
One Piece Spiral Cyclone Coil Direct Heat to every Twist
Door Half of Jacket
Ant Rust Preparation Inside and Out
Self Locking Handle
All Castings Japanned
One Piece Tip Burner
Large Secondary Air Supply
Bottom Feed Mixer
Needle Adjustment Valve

HERE'S THE NEW CYCLONE COIL

A *tapered* True Spiral.
More efficient and different in principle than *any* other.
Employing Nature's principles of centrifugal and centripetal force.
Direct heat impinges on every twist of the Spiral.
Can't choke the gas—it follows the coil *naturally.*
An *even* distribution of heat all around.
With *more* heating surface than has ever before been put into a cast coil.
Yet the Hotstream coil is of standard size.
There is an *unobstructed* free natural water flow.
With *no angles* or flat spots to form sediment pockets.
Longest possible life in bad water districts.
Each coil is *double tested* at a severe air pressure under water.
And we treat each one with a secret *anti*-rust preparation
There is absolutely *NO DANGER* of rusty or discolored water.
You will find Hotstream construction *perfect* in every detail.

GUARANTEED BY

THE HOTSTREAM HEATER CO. - CLEVELAND

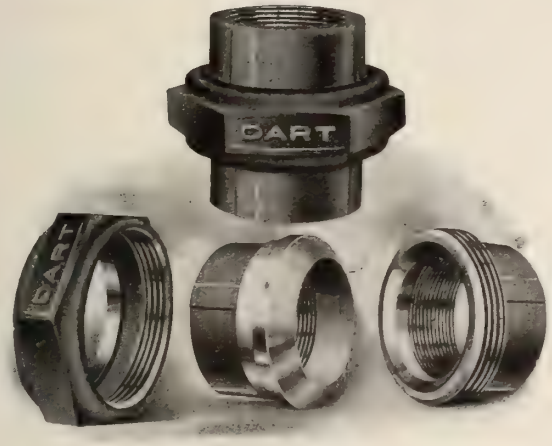
KINDLY MENTION THIS PAPER WHEN ANSWERING ADVERTISEMENTS

Make the work you do advertise your business

Good work holds customers, and is the means of getting many new ones.

Make sure when you leave a pipe coupling job that the joint will remain permanently tight by using

DART **Dart Unions** DART



Both faces of the joint being bronze, there is no deterioration.

The iron parts are extra heavy; they cannot stretch nor pull apart.

Another advantage of using Dart Unions is that they are easily and quickly connected, whether pipes are in or out of line.

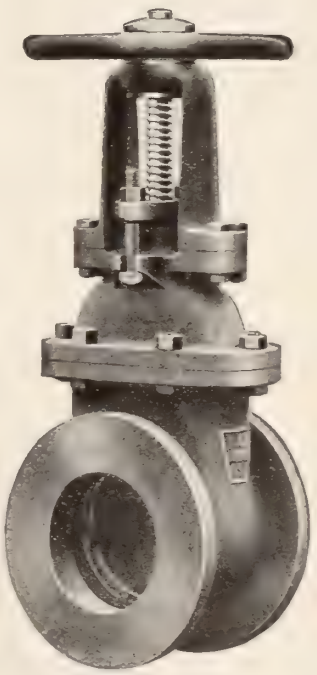
Sold by all first-class supply houses. Absolutely guaranteed.

Manufactured by
DART UNION CO., Limited
Toronto, Canada

There Are Lots of Gate Valves

advertised and sold, but not all of them possess that neat appearance, combined with strength and stability, which characterizes

KERR IRON BODY GATE VALVES

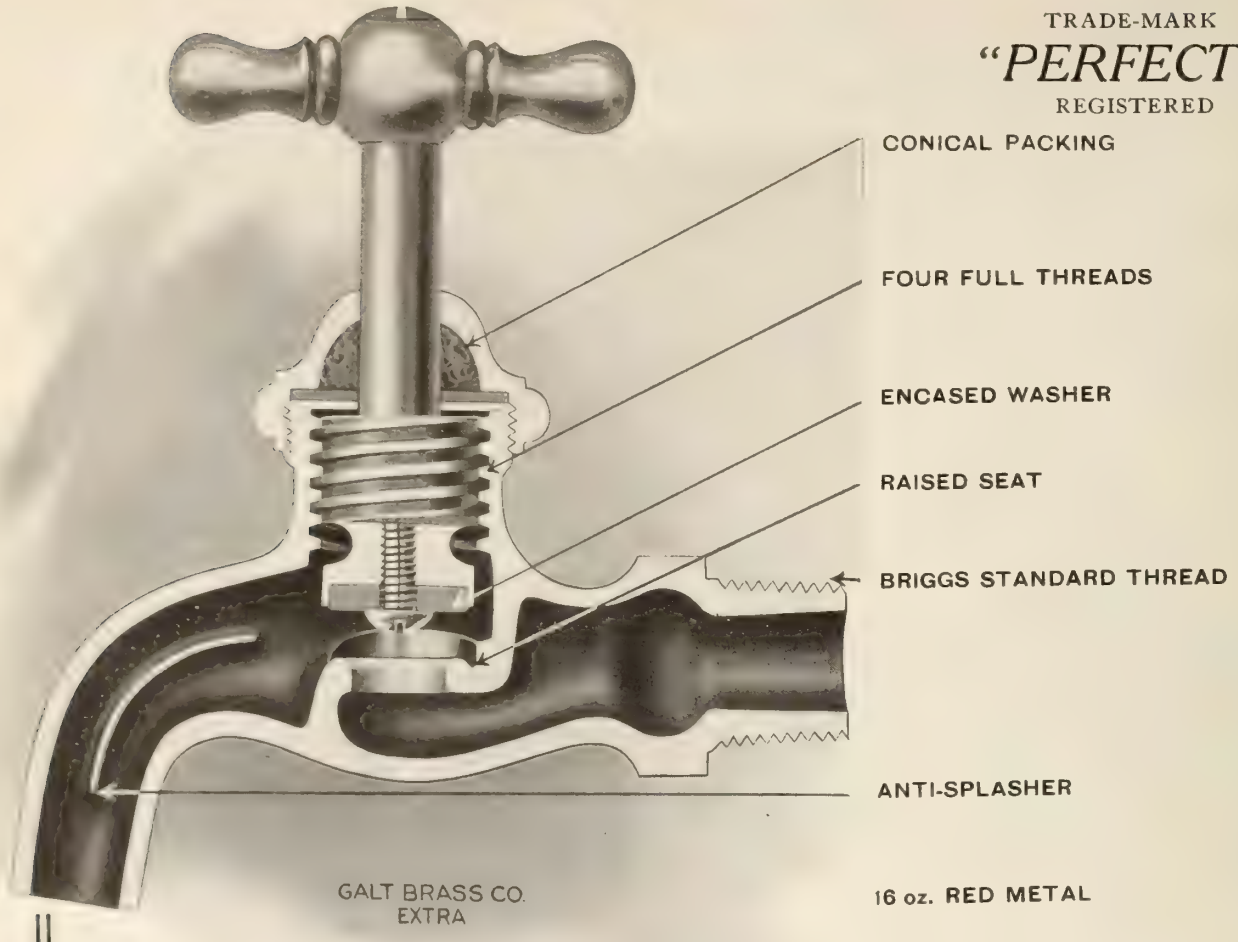


Specify KERR'S (KEYSTONE) Iron Body Gate Valves on your next order, and let us prove what we claim for them.

Our Catalogue No. 5 tells all about them. It is yours for the asking. Write us to-day.

Approved by the Fire Underwriters Association, and Registered by Boiler Inspection Departments of Ontario, Saskatchewan and Alberta.

THE KERR ENGINE COMPANY, LIMITED - Walkerville, Ontario



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. X | Publication Office: TORONTO, JULY 1, 1916 | No. 13

We Have a Complete

STOCK

of Plumbing and Steamfitter's Supplies in London and Toronto

NOTE OUR TORONTO ADDRESS

119 Adelaide Street West

Empire Manufacturing Co.

LIMITED

TORONTO, ONTARIO — LONDON, ONTARIO

THE LARGEST AND MOST COMPLETE BRASS MANUFACTURERS IN CANADA

The Goods You'll Eventually Buy

Based upon a quality, second to none; you make no mistake in starting now to supply your customers with BEAVER BRAND White Enamel Ware

Ask your jobber for BEAVER BRAND CAST IRON ENAMEL WARE
and build up your reputation

EVERY DOLLAR WE OWN STANDS BEHIND THE GOODS WE MAKE

Amherst Foundry Co., Limited

General Offices and Factory: Amherst, Nova Scotia

WRITE YOUR NEAREST AGENCY

AGENCIES:

ONTARIO:
Monarch Brass Mfg. Co., 71 Brown St., Toronto

MANITOBA and NORTHWEST:
E. B. Plewes, 120 Lombard St., Winnipeg

CANADIAN CONSOLIDATED RUBBER CO. LIMITED
DOMINION
RUBBER SYSTEM
AND ASSOCIATED COMPANIES

This Symbol is a Guarantee of Quality in Rubber Goods

It represents the largest manufacturing concern of rubber goods in Canada, and in the British Empire.

It distinguishes the best "Made in Canada" line of rubber goods for sanitary engineers.

It stands for the quickest service within your reach. Don't accept our statement for this fact. Put us to the test and see for yourself.

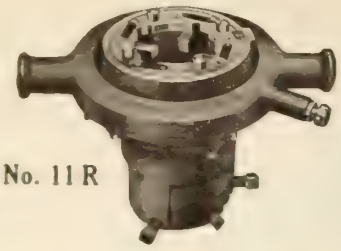
Our aim is to serve and please you and those you serve. Whatever the need in rubber may be, write to our nearest branch, or direct to our head office.

Canadian Consolidated Rubber Co., Limited

MONTREAL, P.Q.

---

28 "SERVICE BRANCHES THROUGHOUT CANADA



No. 11 R

"Jardine" Adjustable Ratchet-Threading Tool

Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely enclosed, excluding chips and dirt.

YOU CAN REDUCE THE LABOR OF PIPE THREADING 50 PER CENT., AND MAKE THREADS AS CLEAN AND PERFECT AS IF CUT ON A LATHE WITH ONLY ONE CUT WITH

"Jardine" and "Toledo" Pipe-Threading Tools

"Jardine" or "Toledo" dies spare the muscle of the man who does the work, and save money for the man who pays the wages, as they enable one man to do the work of two and costs less for repairs. No cams or jimcracks to wear and get out of order. Cutters that cut, don't squeeze. Set of cutters for each size of pipe. Lead screw ensures perfect pitch and form of threads. Adjustable to all variations of fittings, very durable cutters.

All threads finished at one cut. One man does the work of two.

It will pay you to look well into the merits of the "Jardine" and "Toledo" before placing your next order for tools of this kind.

Write for catalog and full particulars.

We'll gladly supply the names if you wish to have a chat with users in your town.

MADE IN CANADA

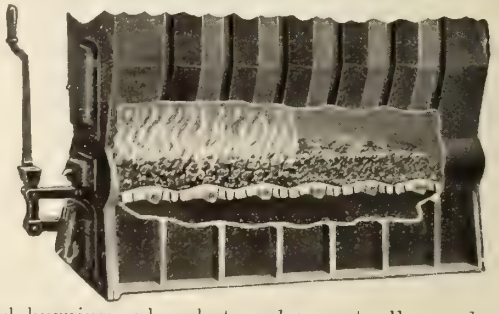
A. B. JARDINE & CO.

HESPELER, ONT.

Sole makers of "Jardine" Pipe-Threading Tools.
Sole licensees to manufacture and sell Toledo Pipe-Threading Tools in Canada.
Agents, Winnipeg and West—Stanley Brock, Ltd., Winnipeg, Man.
Brockville and East—J. R. Devereux, 233 St. James St., Montreal.

Burnham Half-and-Half Heat

and what it means to your customer



IN the early Fall and late Spring come days when a little fire would feel good but when full fire makes things too hot and stuffy. That's when a Half-and-Half Heat comes in mighty handy to the man with a Burnham Boiler.

For, being able to shake his grates half at a time, he can put dead ashes on the back half and run his fire on the front half, getting just the gentle, agreeable heat he wants—no more, no less.

Grates that shake half at a time are twice as easy to shake. And burning only what coal he actually needs just naturally cuts coal bills. So all-in-all, Burnham Half-and-Half Heat means economy, saved energy and increased comfort.

But Burnham Half-and-Half Heat is just one of a host of reasons why Burnham Cosy Comfort Boilers are easy to sell and once sold, stay sold

Our catalog will give you a new angle on boiler selling.

Send for it.

Lord & Burnham Co.

LIMITED, OF CANADA

Boiler Department

Royal Bank Bldg.
TORONTO

Burnham Cosy Comfort Heat

Factory:
ST. CATHARINES, ONT.

OSBORNE HOUSE, ISLE OF WIGHT
FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

ROYAL PALACE OF LA MAGDALENA
SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN

SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

Standard Sanitary Mfg. Co.
Limited

General Offices and Factory: Royce and Lansdowne Aves., Toronto, Ontario

TORONTO STORE
55-59 Richmond Street, West

HAMILTON STORE
20-28 Jackson Street, West

BALMORAL CASTLE
SCOTTISH RESIDENCE OF THE KING AND QUEEN OF ENGLAND

THE QUIRINAL
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ITALY, ROME

BUCKINGHAM PALACE
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ENGLAND, LONDON

PALACE OF THE KING OF THE BELGIANS
BRUSSELS

NEWS ITEM:—

Just one month ago Mr. I. B. Uptodate, of Chilliville, notified Mr. A. Livewire, Heating Contractor, that he was in the market for a Heating System. A. Livewire being posted on everything good in his line of business, advised Mr. Uptodate to put in DUNHAM VAPOR HEATING SYSTEM *With all its natural advantages, as A. Livewire pointed out, it was away ahead of anything in heating systems yet devised, and adding its special features, put it in a particular class. Mr. Uptodate having exceptionally good judgment in matters pertaining to the comfort of his home, gave A. Livewire the contract for*

DUNHAM VAPOR HEATING SYSTEM

After installing the job this is the conversation which took place between A. Livewire and his steamfitter.

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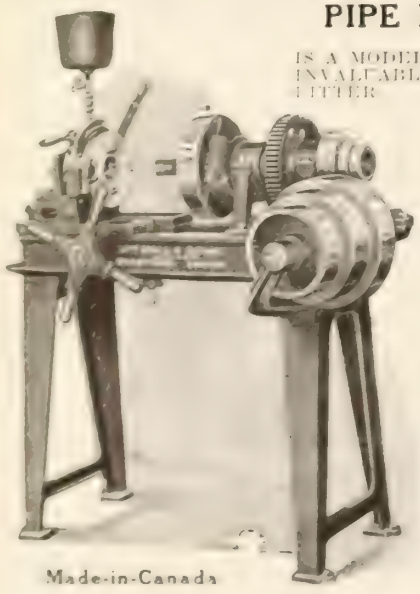

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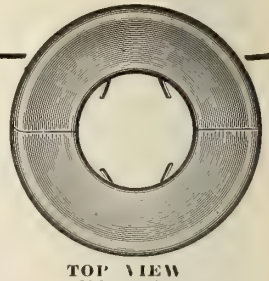

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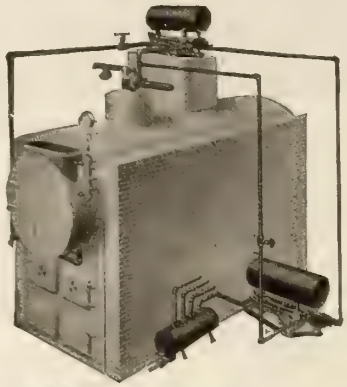

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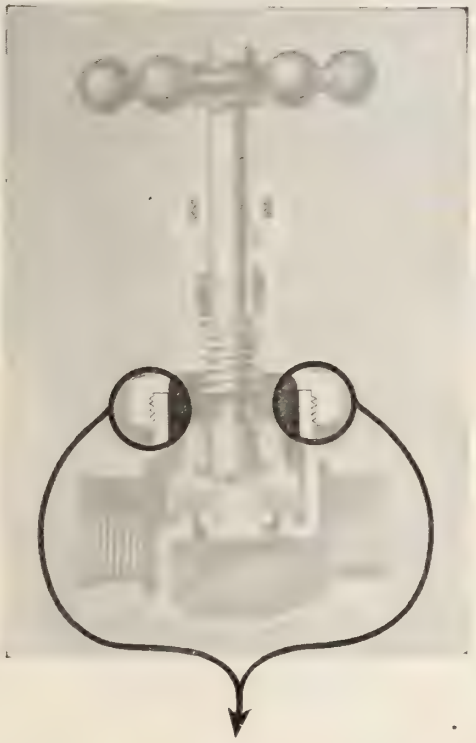

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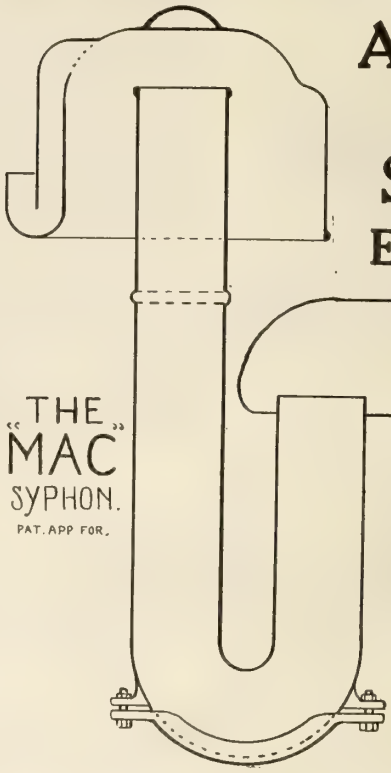

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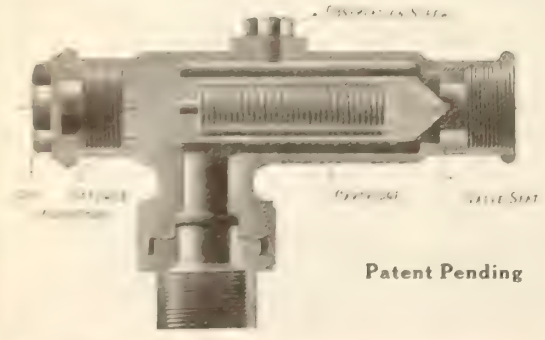

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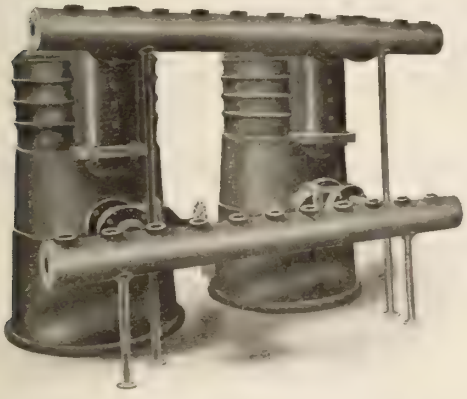

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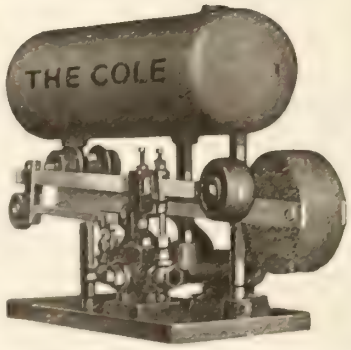

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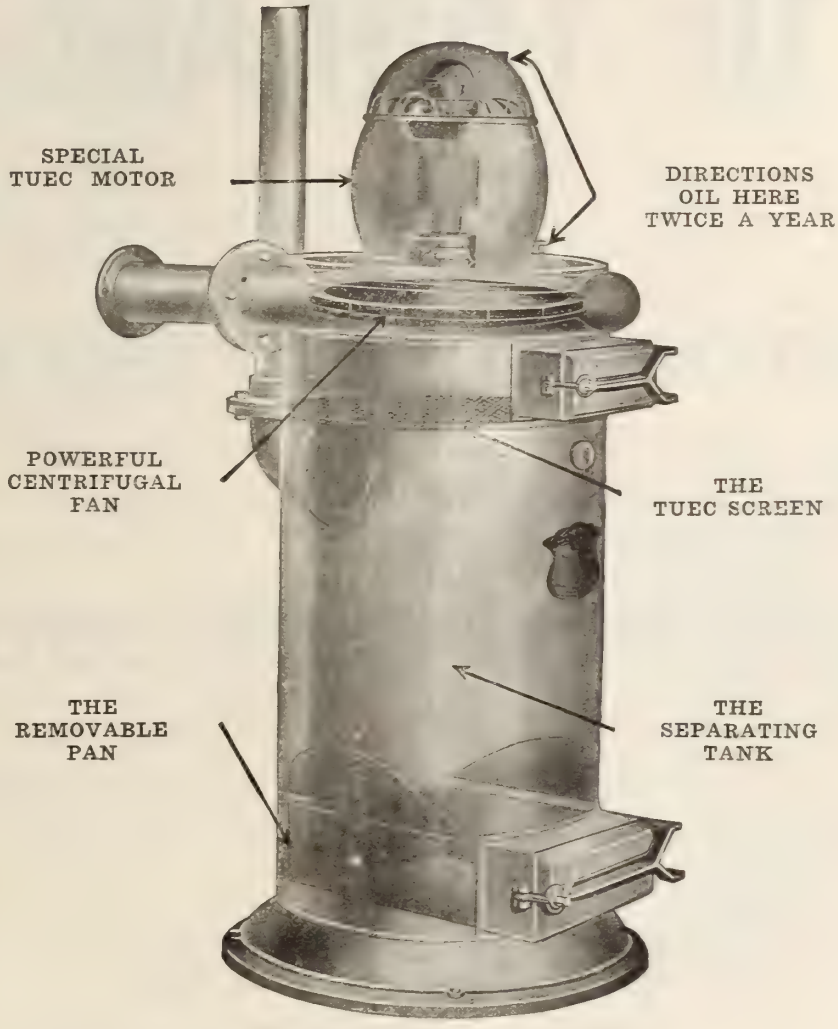

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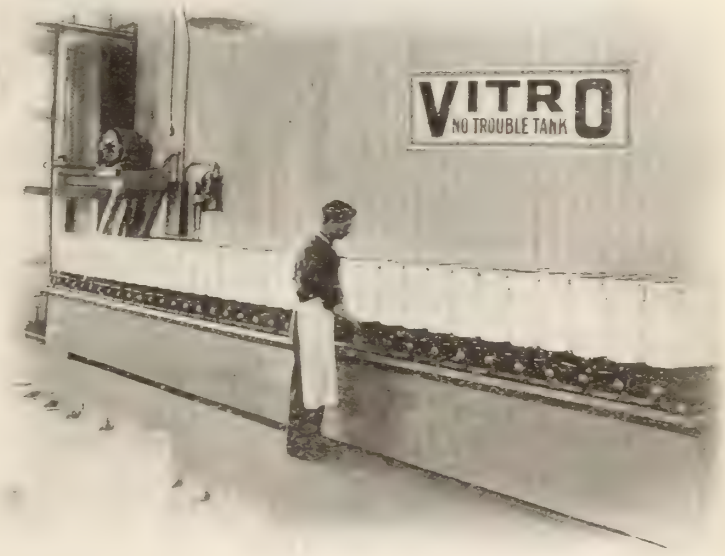

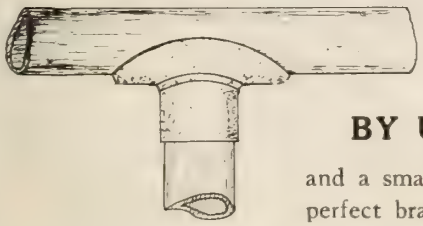
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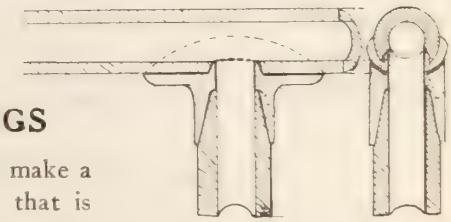
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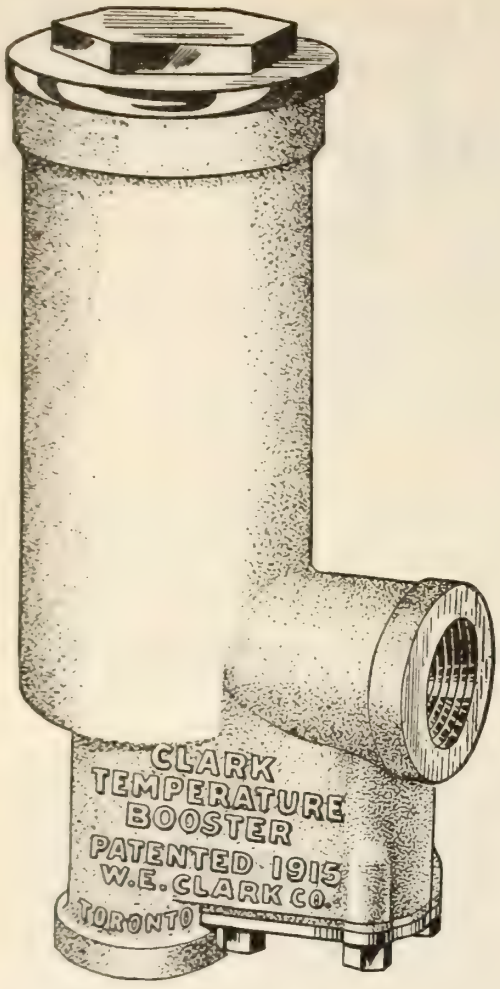

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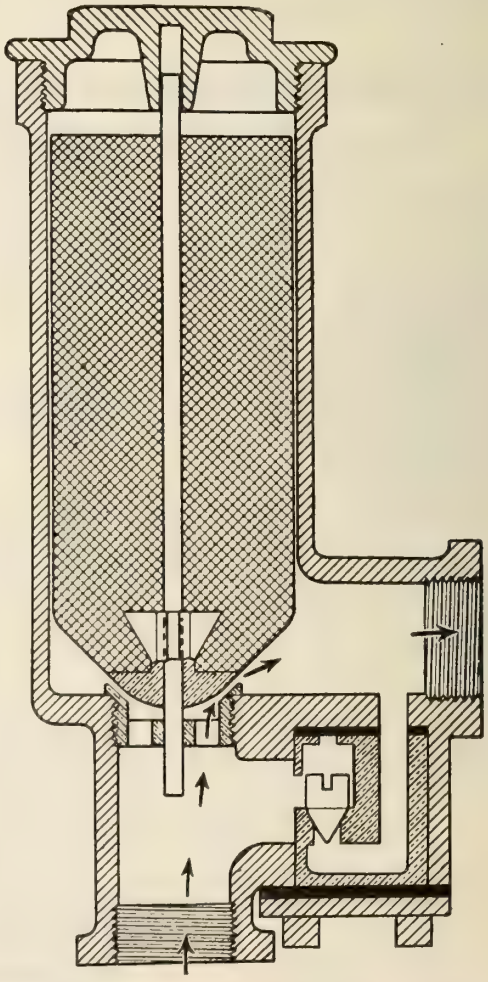

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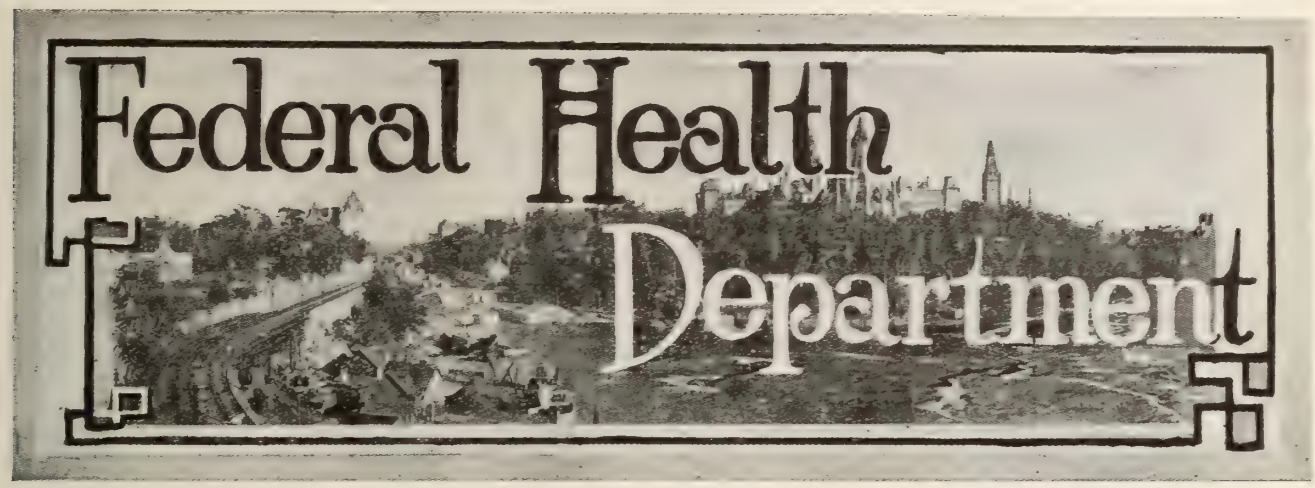
THE SANITARY ENGINEER

VOL. X. JULY 3, 1916 No. 13



By R. O. Wynne-Roberts, Consulting Engineer, Toronto.

THE question whether there should be a federal health department or not is an important one. Canada is an immense country; it has so many diverse conditions—climatic, physical and otherwise—it is in the course of development by a virile people, and it needs careful, thoughtful and systematic administration to produce the best results. Whether the entire control of matters relating to public health should be reposed in about nine separate distinct province authorities, without reference to any supreme body is a debatable question.

At present each province is governed in this respect, as an entity without coordination as to requirements and standards. As health is one of the most valuable assets of a young nation—although it would seem often to be overlooked by a vigorous people—it is desirable that the laws and their administration should be, to some extent, uniform and the department should be endowed with plenary powers so that when any municipality is not fulfilling its duties to safeguard public health steps can be taken to supersede such body. When sanitation was first appreciated in Britain over 50 years ago, the public gave a mandate to the government to establish a department to control matters connected with health, and so the public health board was created, and later on this was superseded by the local government board. This board was given certain authority on municipal administration, and each year the House of Commons has increased its powers until at present they are very extensive and are benevolently autocratic in character.

The local government board now supervises the work of every municipal authority in the country, and in a sense is the supreme guardian over thirty million people. Yet no one questions the justice or prudence of any of its actions. The suggested federal health board could fulfil the same functions and operate in conjunction with or through the provincial departments. It would be a source of strength to the provincial departments, for under the present conditions it is not always possible to administer the laws without discrimination. The North American Act probably renders such a scheme impossible, but it can be amended by consent as it is now being amended to prolong the life of the Federal Parliament beyond the statutory limit.

From the sanitarian's point of view it would be advantageous to correlate the sanitary legislation of the provinces, and to strengthen those which are weak. For example, rivers and their tributaries do not always rise and discharge in the same province. The St. Lawrence, Saskatchewan and other rivers pass through two or more provinces, and the health departments have different conceptions as what should be the sanitary conditions of such streams. Water supply and sewage treatment works are not required to conform to similar standards. Building regulations are as varied in requirements as it is possible for them to be.

Whilst the powers vested in the authorities of each province differ in extent and character, their enforcement is not uniformly carried out. If one province is judiciously administered in respect to questions of sanitation and its neighbor is not, then it is conceivable that the laxity of one may penalize the innocent. For instance, streams which are grossly polluted in one province may constitute the only source of water supply in the other. There is not at present any supervisory board to watch over matters of inter-provincial questions. Water and sewage treatment are problems, which are of great import to the Dominion and a federal health department could undertake comprehensive investigations in these directions. The local government board controls expenditures on public works, it watches over sanitary administration, it investigates outbreak of disease in any locality, and publishes valuable reports thereon, it has power to apply to the courts for a mandamus to carry out certain necessary works which any recalcitrant authority neglects to undertake, it sanctions building and water regulations, and any revision of them, it is divorced from politics and no party seeks to utilize any work done by the board for political ends or to thwart its operation.

It is possible for a federal health board to occupy a similar situation. The Canadian Railway Commission furnishes an excellent example of what can be done in this direction. Health is just as important to Canada as railways. Thousands can and did live in comparative comfort before the advent of railways, but health concerns everybody at all times. The more enlightened the public the more insistent are its demands in respect to health. Where enlightenment does not obtain then it requires a beneficient authority to act wisely and indiscriminately. This fact is amply proved by the condition of the health of the British troops at the front.

Data Relating to Heating Systems

The Time to Study Heating Systems and Their Requirements is When Such Installations Are Being Installed. Many a Splendid System When Being Installed, Has Been Ruined on Account of There Being Very Little Grey Matter Used

By T. W. Reynolds*

HEATING and ventilating are relative to architectural achievement whether it concerns a dwelling, a public building, or a factory, and particularly so under Canadian climatic conditions generally, to some extent the one is the counterpart of the other, although most often, and especially in large establishments, separate provision is made. Data concerning heating and heating systems constitute the substance of this series of articles, and being diagrammatically illustrated, no difficulty should be experienced in following intelligently the various methods employed and deriving real profit as a result.

Definition of Terms

Direct heating is that method whereby the radiator is placed within the room to be heated.

Indirect heating is that method whereby the radiating surface is encased within a duct and air is caused to flow between and around the radiator sections by natural or mechanical means, thus conveying heated air into the room or rooms to be warmed.

A water line is the height at which the water will stand in the boiler or return, being slightly higher in the latter due to drop in pressure of the steam through friction in the mains.

A wet return is a return line of piping carried below the water line of the boiler.

A dry return is a return line of piping carried above the water line of the boiler. A dry return may be converted into a wet return by establishing a false water line or seal above the height of the water line in the boiler.

Flow pipes are those pipes carrying the heating medium from a boiler or furnace.

Return pipes are those pipes carrying the heating medium back to the boiler or furnace.

Such rooms used in the following discussion are commonly found in works [illegible] of heating and ventilating.

General Pipe Work

[illegible] illustrate the relative location of various parts of the system described, but are not drawn to scale. The heaviest black lines show the larger sizes of the piping.

[illegible]

Radiators

The proper location for radiators is close to the coldest walls and under the windows where possible, and so arranged that all cold currents of air must first be warmed by these surfaces before striking the body. They should be set at a sufficient distance from the wall to allow a free circulation of air around them. The most efficient radiation is that whose surfaces are exposed to the coldest currents of air. More radiation should be placed on the northern or severest exposure than on the protected side. The diagrams show the radiators at an exaggerated distance from the wall.

The round upright cast iron boiler is the best for installations up to 1,200 sq. ft. of radiation. Above this amount use should be made of the rectangular cast iron sectional steam boiler. Cast iron will not as readily corrode as wrought iron or steel when standing idle in the summer months. It may also be easily molded into efficient cored waterways.

Fuel

Anthracite is the most desirable fuel because of its high carbon and hydrogen carbon content, small amount of ash, and lesser deposits of soot on fire and flue surfaces of the boiler. Bituminous coal requires a boiler one size larger.

The return pipe at the boiler should be fitted with a brass roundway plug cock with square head. The end should be left in sight as a direct connection to the sewer would fail to disclose any leakage due to defects or careless closing of the cock. A feed cock should be installed on the water supply line at a point convenient to the reading of the water gauge glass. If it is necessary to supply the boiler by hand, this should be done through the return pipe to the return connection. A stop cock should be installed on the pipe and end with a funnel approximately twelve inches above the water line of the boiler. It is advisable to install a check valve just below this to prevent the blowing out of the water should the stop cock be left open.

Air valves are either automatic or positive. The positive or compression air valve is hand operated and combines simplicity with a certain amount of radiator control as the valve may be closed before all of the air has been expelled. The effect is to partially heat the radiator. Cast iron fittings should be used throughout. As they are less elastic and of a harder metal than the pipe, they will not as readily leak when connections are made.

In general the steam main in a steam heating apparatus is carried as high as possible in the basement or cellar and is then pitched downward away from the boiler. This is done to prevent the condensation from flowing in an opposite direction to the steam. Only where the pipes do not exceed twenty or thirty feet in length should the steam and condensation be allowed to flow in opposite directions. In such cases the pipes should be made slightly larger with drips at a number of points. The pitch of the pipes should also be increased.

Water Hammer

When the pipes are long, there results a large quantity of condensation which becomes enough cooler than the temperature of the steam to cause the latter to condense quickly. This condition causes hammering in the steam pipes which may be likened to the beating of a sledge hammer upon some metal surface. Steam rapidly condenses when in contact with cold surfaces, the resulting vacuum inducing a rapid flow of more steam which slams the condensed steam (water) against elbows, valves, bends, etc., with terrific force. The volume of steam at atmospheric pressure is 1,644 times greater than when condensed to water.

Steam condensing in contact with cold water creates severe concussions as the two bodies of water come together, therefore slow admission of the steam to cold pipes or to those which hold some water is advisable. The harm done by this hammering is in some cases very severe. It loosens the threaded joints, bursts fittings or pipes, and otherwise causes a great deal of annoyance. An enlargement of the main steam pipe at the boiler or a separator made up of fittings is very effective in preventing the entrained water in the steam from being carried through the pipes and causing water hammer.

The main supply pipes must be carried around the basement in such a manner that windows or doors are cleared and that proper head room is provided in passageways and rooms. It is advisable

to keep the main supply pipe at least four feet from the outside walls. This provides for expansion in the risers without placing excessive strain upon the fittings and threads. The coldest portion of the building (which happens to be the northwest in this latitude) should always be supplied most directly by the mains and should receive preference in every way possible.

System Provisions

In general, the system must be proportioned for the worst possible conditions, such as excessive steam demand in certain rooms, open windows, loosely fitting doors and windows, poor construction and shrinkage, buildings so constructed that air freely circulates between studding and crosswise through ceilings, air bound radiators, stoppages due to short bends and valves, variations in pressure or water temperature, poor coal or poor firing, a fire requiring too frequent attention, improper firing periods, unclean fire, a fire pot too full, ash pit seldom emptied, poor draught, insufficient radiation or boiler capacity, dirty or rusty air valves, trapped riser connections, which may have been depressed by the gas fitters or by others, loose valve seats, poor condition of chimney, accumulation of oil, grease or grit in the system, a poorly designed installation due to unreasonable demands of the owner, radiators used as clothes driers, supports for statuary or in other ways preventing contact with a free circulation of air, also many other faulty arrangements or methods of operation liable to occur.

Return Pipe Sizes

The return pipes must in all cases be of ample size to carry the water of condensation. They should be run below the main in which the steam flows. A wet return can be of smaller size than a dry return, as it is entirely filled with water at all times, steam naturally having a larger volume than when condensed. A dry return should never be less than 18 in. above the water line of the boiler, preferably 3 ft., as this permits a greater reduction in pressure. The return pipes should always pitch toward the boiler. Where traps are used to return the water to the boiler, the return line should be graded in the direction of the low trap. It is always best to put a horizontal swing check valve on the return line near the boiler of any steam plant to keep the water line of the boiler steady. It also serves as an automatic stop valve should the main steam valve be accidently closed. When two or more returns are connected together, the connection must always be below the water line of the boiler. This prevents the flow of steam from more than one direction. Pressure decreases in accordance with the distance from the boiler and friction surface encountered, steam tending to flow through the line of least resistance to the place of lowest pressure.

The size of supply mains should not be reduced too rapidly as the branches are taken off. Friction is much greater in proportion in the smaller sizes of pipes, the ratio of friction surface to volume increasing rapidly. An installation will produce better results if all pipes are one or two sizes large, but very unsatisfactorily, if at all, when they are undersize. Pipe smaller than ¾ inches should not be used, either as supply or return pipes, for allowance must be made in figuring the cross area of pipe required for certain practical conditions, such as inside pipe corrosion, good drainage, pockets, sagging of pipe, mechanical injury, etc. As a general rule valves are not necessary on the mains. They only serve to increase the first cost and maintenance.

Pipe Expansion and Contraction

Broken joints and leaks result from the expansion and contraction of pipes, so that it is very essential to provide for this, likewise to see that all pipes have the proper alignment and that no traps or pockets are allowed to form where reductions are made (eccentric fittings may be used or lines dripped at such points) or any other pockets caused by the sagging of the pipes. Pipes should be held firmly in place and prevented from sagging by using substantial hangers. The expansion of risers if not properly provided for will form pockets at their connections to runouts from the main.

There are several methods or devices designed to properly take care of expansion. Those in most common use, are, the swing joint which is a connection made up of four or more elbows; the U shaped pipe bend which takes care of the lengthing or shortening of the line in the "spring" of the bend; the patented slip expansion joints which are made in both the packless and the stuffing-box type; and the diaphragm joint which depends upon the flexibility of a thin metal corrugation or bellows usually made of copper. All piping systems should be designed so that the least possible strain is brought to bear upon fittings in the lines.

Type of Building Consideration

Piping installations in fire proof buildings may differ from those in frame structures. In many modern buildings (whether fire proof or not) it is desirable to conceal the pipe work. This may be effected if chases of ample size are provided, allowing for the free swing of all pipes and joints when they expand or contract. All piping concealed in chases should be insulated with pipe covering to prevent an excessive loss of heat through the walls (where these are outside walls) and to prevent cracking of the plaster. All piping in the cellar should also be covered, as more or less heat is lost through even the best pipe covering, and this amount is usually sufficient to warm the cellar to above freezing temperatures. In figuring the necessary boiler capacity required, all mains and branches should be connected as radiating surface unless thoroughly covered with a good heat insulator.

Globe valves offer considerable resistance to the flow of water in pipes and should for this reason never be installed in hot water heating systems. If used in steam plants they should never be set vertically on a horizontal pipe, otherwise the free drainage of the pipe is impeded, and the condensation retained until the cross area of the pipe is practically filled. This is due to the interior projecting web or diaphram which forms an integral part of a globe valve.

ASBESTOS IN THE TRANSVAAL.

The United States Consul at Johannesburg reports that he has received information from the secretary of the Transvaal Manufacturers' Association, Johannesburg, of a recent discovery of fibrous asbestos occurring in rock formations in which asbestos has not heretofore been found. It is of a new and superior character, and one which, it is thought, may have an important bearing on the asbestos industry. It is said that the available quantity is considerable; that it is of a new colour, mostly golden brown, of a greater length than any mineral fibre previously known, and of good weaving strength. The owners of this mine are prepared to enter into contracts to supply regular shipments. The owners of the mine are willing to supply samples, and if a larger bulk sample is required for manufacturing tests they will be willing to send any quantity from 10 to 100 tons, at £18 per ton, f.o.b. any South African port, for that purpose only. The consul suggests that those interested in this product should communicate directly with the Secretary of the Transvaal Manufacturers' Association, 20 Cullinan Buildings, Johannesburg.—London "Chamber of Commerce Journal."

COPPER PRODUCTION IN SIBERIA

The copper production of Siberia in 1906 was only 600,000 pounds a year. It now exceeds 2,000,000 pounds. This large increase is largely due to British capitalists who have financed the chief copper foundries in the Ural districts and in Western Siberia. Siberia gives promise of becoming one of the chief copper-producing countries of the world.

THE SANITARY ENGINEER

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STANDARDIZATION

THAT standardization of materials used by sanitary and heating engineers is necessary was proved beyond doubt by several members of the trade as well as by a number of manufacturers who were in attendance at the convention held in London recently.

The question is, how can this be brought about? "The Sanitary Engineer" ventures to reply by advising all those interested in the question to get together oftener to discuss and thrash out to a finish one or two things at once. For instance, with regard to the standardization of soil pipe and fittings, a great deal of work has already been done by the Canadian Institute of Sanitary Engineers, Winnipeg, and one manufacturer at least is making changes in his patterns to meet these requirements in the Western provinces. The next thing to take up would be the adoption of a standard for brass ferrules, which should deal with weight, size and form. Then would come the adoption of a standard for lead waste pipe, traps, lead bends, etc., followed by the standardizing of brass tube.

Just let us consider what such changes would bring about. Manufacturers would be able to dispense with thousands of different styles of patterns. They could make standard tools or procure them at much less cost. Their overhead expenditure could be reduced in both office and factory. Bigger stocks of fewer kinds could be carried at less cost, which would result in better service to their customers. They could buy their raw material in larger quantities and at better prices.

The sanitary and heating engineer could also buy to a better advantage and carry greater stocks of one kind instead of small quantities of a large variety, which means that stocks at the present time have to be replenished frequently, often meaning costly express charges and loss of time.

Lastly, but of no less importance, comes the question of uniform sanitary engineering by-laws. It is next to impossible to compile a uniform code of by-laws unless materials become standardized. Therefore, it can plainly be seen that standardization of materials is greatly to be desired, and if "The Sanitary Engineer" can do anything to assist in the accomplishment of such work, it is at the free disposal of those endeavoring to bring such matters to a successful issue.

UNIFORM PLUMBING CODE

AT the Fifth Annual Convention of the Ontario Society of Domestic Sanitary and Heating Engineers, the question of a uniform plumbing code for Ontario was discussed at considerable length.

It was pointed out that as a result of a great deal of hard work, the Ontario Public Health Act had been amended and additions made to said act which empower the Provincial Board of Health to consider the adoption of a uniform plumbing code.

Prior to this new addition to the Ontario Health Act, it was not possible to consider in any way the adoption of a provincial plumbing by-law. The Ontario Society have already drafted a proposed provincial by-law which no doubt will receive the attention of the powers that be at no distant date. But in the meantime a great deal of good can be accomplished by the craft if the matter is discussed from as many angles as possible, so that when action is taken many points which will be more or less out of keeping with present conditions throughout the province will be cleared up.

PUBLIC COMFORTS

THE question of providing an adequate number of public comfort stations in every city, town or village was taken up very thoroughly at the recent annual convention in London. E. H. Russell, past president, brought out some very interesting points. He no doubt has given this problem a great deal of thought.

He pointed out that with prohibition coming into force in the province of Ontario, as well as other parts of the Dominion, a large number of hotels would be closed and these have and are at present furnishing a great deal of lavatory accommodation which will not be at the general public's disposal later.

Many other very interesting features in connection with the way conditions could be improved were also dealt with. Mr. Russell is of the opinion that by the members of the trade co-operating with assurance, insurance and fraternal societies, much could be accomplished.

REDUCE YOUR OVERHEAD

IF every trade paper in the world were to devote at least a page each issue to the question of overhead expenses, and only one in ten subscribers were to read the article, the trade papers would be doing one of the greatest services to the business world that ever was accomplished, providing, of course, that that 10th person put into practice the precepts preached.

One of the greatest actual business losses is excessive overhead expenditure. Just to cite one or two cases let us illustrate how certain overhead expenses are incurred in the sanitary and heating business:

Shortage of small fittings, fittings which at most only cost a few cents a piece, is one source of time wasting, when a small stock of every one of such fittings would not cost ten dollars.

Just recently a proprietor of a business had to make a trip which took over an hour to get several such fittings; total invoice cost of fittings was only 35 cents, but how about overhead. One hour boss's time worth at least 75 cents. One hour use of his car, wear and tear, gasoline, etc., at least $1.25. Total $2. Not very much in itself, but this very thing is happening every day. $2 is equal to 5 per cent. on a $40 investment for one year, which means that a person with a good bank credit charging 5 per cent. could have the use of $40 for one year for what it had cost him to buy 35 cents' worth of goods. It's the little leaks which make up excessive overhead expenses. It's the drops of water which keep the ocean full.

Ontario Society's Successful Convention

Meetings at London, Ont., Preceded Those of the Canadian Society—G. R. Maxwell, of Toronto, Elected President—Will Meet in Toronto Next Year—American Manufacturer Says Public Comfort Stations Will be Needed More Than Ever

THE annual Convention of the Ontario Society of Domestic Sanitary and Heating Engineers was held in London, Ontario, on June 19 and 20, and preceded the meetings of the Canadian Society. While the attendance was not large, much good resulted to those who were present. The deliberations were opened by a meeting of the Executive, which disposed of some preliminary details.

Executive Meeting

The meeting of the Executive Committee of the Ontario Society of Domestic Sanitary and Heating Engineers was held at 10 a.m., June 19, 1916, in the Foresters' Hall, Imperial Bank Building, London, Ont. Those present were:

President E. H. Russell, London; Vice-president James R. Haslett, London; Treasurer, A. E. Gibbons, London; Secretary, G. F. Frankland, Toronto; and R. McG. Coyle, Chatham.

Upon motion of J. R. Haslett and A. E. Gibbons, the minutes of last annual meeting and of the Directors' Meetings as held during the year, excepting the minutes of the last Directors, Meeting, be taken as read.

Secretary Frankland read the minutes of the last Directors' Meeting held on January 26, 1916. Upon motion of J. R. Haslett and A. E. Gibbons the minutes were accepted, same to be presented to the meeting, with the item are W. Skelly eliminated.

President Russell read the Directors' report. Upon motion of J. R. Haslett and A. E. Gibbons the report was received, which will be presented to the meeting.

Secretary Frankland read statement of finances for 1915, ending January 31, 1916. Upon motion of J. R. Haslett and A. E. Gibbons that report be received and that per capita to the Canadian Society be paid only on members in good standing. The Trustees' statement was left to be read at the meeting.

Moved by J. R. Haslett and seconded by R. McG. Coyle that any agreements entered into by any local Society with the journeymen is regarded by the Board of Directors as a local matter and that the form of agreement as adopted in Toronto be presented to the meeting.

Vice-president Haslett requested information as to the success obtained in collecting back dues. Secretary Frankland reported that there had been no greater success with all the means taken than previously. No reports were on hand from the chairman of committees.

The following applications were received and accepted pending the report of the Examination Committee; H. Aked, London; John W. Oram, Toronto; Sheppard & Abbott, Toronto; Kenneth B. Allison, Toronto; George R. Baker, Toronto; William J. Hall, Toronto; George Trickey, Toronto; W. C. Cameron, Toronto; S. H. Adamson, Toronto;

On motion of J. R. Haslett the meeting adjourned at 12.30 p.m.

Opening Session

President Russell in opening the deliberations of the Convention said: On the inside of the programmes you will find the rules of order and the business. We will take up the first item of business in the roll call. Secretary Frankland then read the roster of members, who were registered as follows:

E. H. Russell, London; James R. Haslett, London; A. E. Gibbons, London; Garrett F. Frankland, Toronto; John Cunningham, Paris; Benj. Eggett, London; C. F. Needham, London; Thos. Maxwell, Toronto; J. E. Fullerton, Toronto; H. Aked, London; Edw. Holland, London; R. McG. Coyle, Chatham; T. J. Minnes, Brantford; J. Anguish, Brantford; L. Cook, Stratford; F. O'Donoghue, Stratford; Geo. E. E. Grinyer, Guelph; Jno. McKinley, Ottawa; C. R. Myers, Stratford; J. J. Robb, Stratford; W. Rodgers, Stratford; Fred Sylvester, Stratford.

Secretary Frankland introduced L. A. Cornelius and the freedom of the Convention was accorded to him. Secretary Frankland then read the report of the Executive Committee.

On motion of J. R. Haslett seconded by James E. Fullerton the minutes of the executive were adopted. President Russell then presented his report as follows:

PRESIDENT'S REPORT

In addressing the convention, President Russel said:

Gentlemen of the Fifth Annual Convention Ontario Society Domestic, Sanitary and Heating Engineers: "I am pleased indeed to welcome you. The first convention was held here in 1903, the President being William Mansell. The intervening years have seen many changes and a great amount of really good work has been done. Those of you who were with us in 1903, looking back, will so regard it. One important and very noticeable thing is the way the idea of trade organization has grown so that to-day it is considered absolutely essential in every line of business. Those who do organize, seems to continue longer than formerly. Should it appear to you that conditions are far from what they should be, it is well to remember they are exactly in accordance with the effort you have collectively put forth, no better and no worse. If you question this consider what conditions would be had there been no organization at all.

You will remember that when the present officers were elected, we were endeavoring to form an Accident Prevention Association in connection with the Workmen's Compensation Act which would have been of great benefit. However, the expense involved was given as the reason that the Workmen's Compensation Board decided against the proposal. Since that time the working results have proven our class much less hazardous than was supposed, and the rate struck for the present year is very much smaller than was expected, and while individual members had to stand the expense of attending the many meetings in relation to the above certain modifications were obtained in the first stages that would not have been obtained had the matter been allowed to go by default.

The amendment to the Provincial Public Health Act, being passed is the Society's best work up to date.

The work of the Society has been about as in previous years, with the war acting as a great depressant. I would like to emphasize the fact that it is almost impossible to prosecute the work of the Society with the officers in one city and the Secretary in another. The logical place for the Ontario Society to operate from is Toronto. There was a motion passed in connection with this some two or three years ago, but it has been ignored.

In reference to the balance sheets the officers in London take exception to the method used. They do not question the correctness so far as it goes, but it is misleading and has been for the past four years, and while it shows a respectable balance on the right side in reality there has always been a deficit accumulating year by year till in 1915 our position seemed extraordinary, to say the least, more money collected, more raised by loans, the Trust Fund drawn upon and the 1916 dues spent before the advent of the year. The present officers declined to continue the Secretary's salary after October 1, 1915, a period of three months after coming into office wholly because it was impossible to get out of debt. Much light will be shed upon this by the letters from myself to Secretary Frankland, and I make this frank statement in order that no misunderstanding may arise later. If my memory serves me it was London members who brought in the motion that the Convention should always be held in Toronto, knowing full well that if the Society could not be operated successfully there it could not be operated elsewhere. I commend the foregoing to your earnest consideration.

E. H. RUSSELL, President.

B. Noble, London, moved and C. E. B. Grinyer of Guelph seconded that tht report be adopted and the recommendations be referred to the resolutions committee.

Messrs. Grinyer of Guelph, Fullerton of Toronto, and Coyle of Chatham were named as a resolutions committee.

Messrs. T. Maxwell and J. R. Haslett were named a select committee to report on the Secretary's books and other matters.

Prohibition Will Make Comfort Stations a Necessity

T. A. Cornelius, of Grand Rapids, Says There Should be Standardization of Materials—Financial Statement

"I TAKE it that your objects are to increase your efficiency and earning power. I believe in promoting public comfort stations that you not give the credit to societies of this kind that they merit. Much thought recently has been given to the question of apprentices. I believe men are choosing a much higher type of apprentice. The apprentice of to-day is the master plumber of to-morrow.

"I have jumped from Grand Rapids to London to get information. I have tried to keep in close touch with such organizations as yours. I have come here to get in touch with you in order to get ideas. It is absurd to leave the choice of materials between the manufacturers or to the decision of one man or boy as to the requirements of that community. Requirements for Saskatoon or Winnipeg should be all right for London or Toronto. As now there is no basis for the selection of material I hope to be able to get some ideas in individual talks with you.

"I do not know what you have done in the way of public comfort stations. I heard an argument given by the chief

Park Scenes at London, Ontario. London is famed for the beauty of its parks. The photographs reproduced above are taken at Springbank Park, between 200 and 300 acres of picturesque pleasure ground with pavilion, open air theatre, picnic ground, athletic grounds and river boating.

medical health officer of San Franciso as to the moral value of these stations in a community. The work should come from the health boards rather than the master plumbers. But the public requires them, and will continue to require them more with the closing of saloons. I am a member as a sanitary engineer of the American Society, not as a manufacturer. The support of the manufacturers to the various societies is well worth seeking.''

President Russell: It seems to me we have reached a stage in this country where we can not hope to do very much by ourselves. What is required is a combination of the three parties who are interested in the public health. Legislatures only take up the questions that are forced upon them. If you get an enactment of any kind whatever, it simply shows that great pressure has been brought to bear upon them. The three bodies are: The insurance, assurance and fraternal societies; second, the manufacturers of sanitary appliances; and third, those who instal them.

Insurance societies want you to live forever. Manufacturers want to make more goods and we want to install more and more goods. If we are to get any enactment it must be by the combination of those three forces. The members of the government as in many instances holders of stock in these concerns should be interested in getting these laws enacted.

J. R. Haslett moved a vote of thanks to L. A. Cornelius for his kindness in addressing the meeting. President Russell conveyed to Mr. Cornelius the thanks of the meeting.

Mr. Cornelius in replying said he thought if the two bodies could exchange the record of their doings it would be helpful to both parties. The two bodies to which he referred were the American Society of Engineering of which he is a member. and the Canadian Society.

Financial Report

Secretary Frankland then presented the statement of finances of the Society. Receipts for the year were $1,462.24, disbursements $1,456.35, leaving a cash balance of $5.89. The liabilities were stated to be on February 1, 1916, $490.-11 and the assets, including office furniture and unpaid membership fees, $1,-065. The complete report follows:

Financial Statement.

1915.

Receipts.

Feb. 1	By bank balance	$ 165.44
6	" dues received	45.00
19	" " "	15.00
25	" " "	15.00
March 5	" " "	55.00
10	" " "	15.00
18	" " "	55.00
April 6	" " "	10.00
15	" " "	10.00
21	" " "	25.00
21	" cash, bul'tn ad.	7.50
21	" dues received	185.00
28	" " "	10.00
June 1	" " "	100.00
16	" " "	286.00
18	" cash, bul'tn ads.	15.00
19	" dues received	70.00
19	" cash re loans	80.00
19	" cash re loans	75.00
July 20	" cash, bul'tn ad.	7.50
20	" dues received	10.00
Aug. 18	" " "	60.00
18	" cash, bul'tn ads.	15.00
18	" cash re loan	5.00
Dec. 18	" cash bul'tn. ad.	15.00
30	" dues received	10.00
31	" cash, endow. fd. loan	100.00
	Total receipts	$1,462.24

Disbursements.

Feb. 22	To secretary's salary	$ 100.00
22	" general expenses	19.60
22	" annual Government fee	1.00
March 22	" Fred Smyth, bulletin	6.00
April 5	" Fred Smyth, bulletin	6.75
26	" Fred Smyth, printing	7.00
27	" Can. For. Hall, Ltd., rent	10.00
27	" D. M. Christian, stenographer	15.00
27	" general expenses	31.15
27	" secretary's salary	200.00
27	" Can. Soc. 1914. Pr. Cal.	130.00
27	" C. H. Hoople, refund	10.00
June 1	" Fred Smyth, printing	20.50
1	" postage, stationery, etc.	42.85
18	" secretary's salary	400.00
18	" traveling expenses, postage.	43.05
18	" Can. For. Hall, Ltd., rent..	5.00
18	" Fred Smyth, printing	1.50
18	" Can. Society, 1915 per capita	130.00
July 20	" Fred Smyth, bulletin	5.00
Aug. 16	" travel. exp. and stationery..	42.70
16	" secretary's salary	40.00
16	" Fred Smyth, bulletin	5.00
Oct. 20	" Fred Smyth, bulletin	5.00
Dec. 24	" Fred Smyth, bulletin	6.00
28	" Sutherland, printing, stat'ry	24.25
28	" Smith, Rae & Greer, lawyers	20.00
28	" G. F. Frankland, expenses	69.00
	Total disbursements	$1,456.35
	Balance in bank	5.89
		$1,462.24

A. E. Gibbons, Treasurer.
G. F. Frankland, Secretary.

Note: The receipts are made up as follows:

1914 balance	$ 165.44
Dues	976.80
Loans	160.00
Endowment Fund loan	100.00
Bulletin advertisements	60.00
	$1,462.24

Liabilities.

Secretary's salary	$ 200.00
Postage and stationery	36.00
Special loans	100.00
	$ 496.00
Less bank balance	5.89
Deficit	$ 490.11

Assets.

Office furniture	$ 30.00
Dues unpaid for 1915 (19 unpaid)	190.00
Other unpaid dues, 1912, 1913, 1914 and 1915	845.00
	$1,065.00
1916 revenue assured, 43 members at $10 each	$ 430.00
Toronto Committee	190.00
19 members, as per assets	190.00
Possible revenue, any part of assets as shown	$ 810.00

President Russell then presented the applications for membership. On motion these were received and passed on to the committee. Business was then suspended for a half hour to enable the various committees to get together and bring in their report on resolutions and membership applications.

Views of the Thames River on which London is situated. The Thames at this point winds through exceedingly picturesque

PRACTICAL SHEET-METAL WORK

THREE PIECE ELBOW WITH SLEEVE OR GORE PIECE.

BY THOMAS STANFIELD

IN this issue we show a flared article square in plan at the base, but oval in section at the top, the top being at an angle to the base. On the line A B is shown a section of the top.

To lay out plan as shown, draw a line parallel to base D C and draw lines from the base cutting line just drawn forming D C on plan. On this line erect a square as shown by D C B A; through this square draw the centre line E F as shown. Divide the section on A B of elevation into an equal number of parts and from each point draw a line at right angles to A B and intersecting it; from each of these intersections, draw lines at right angles to D C extending them until they intersect centre line E F on plan. From each of the points on E F set off on these lines the distance from the line A B in elevation to divisions on section, placing distances at 1 on 1, 2 2 from 2, 3 3 from 3, 4 4 from 4, etc.

When all are set off, draw a line through points obtained, outlining plan of top; these points are also connected to the corners as shown by A 1, A 2, A 3, A 4, A 5 and B 5 to B 9, and form the bases of the angles from which measurements are derived. To obtain height or altitude of angles extend D C of elevation as shown by A 5, and erect at right angles to it A X; from A set off the heights of points 1 2 3 from D C as shown by broken lines, and to avoid confusion of lines, draw another angle and on it set off heights of points 4 and 5, on their bases, from A set off the base lines on plan from A to 1, A to 2, A to 3 and A 4, A 5. Form two other angles in a similar manner, setting off the height from D C to 5 6 7 8 and 9, and the base lines B to 5 6 7 8 and 9. The lines on angles X 1, etc., form the measurement required on the different angles.

To lay out pattern draw a line as E 1 equal in length to A D on elevation. With E as a centre and E A on plan as a radius, draw an arc. With 1 as a centre and X 1 at angle A as a radius, draw an arc intersecting arc drawn from E. obtaining point A, then draw lines joining E A and A 1. With A as a centre and X 2, X 3, X 4 and X 5 at A as radii, draw arcs intersecting each as drawn with arc drawn from point 1 or last obtained point, the radius of this arc being one division on outline of section at A B. When point 5 is obtained draw a line joining A 5.

With A as a centre and A B on plan as a radius, draw an arc with point 5 as a centre and X 5 at angles at B as a radius, draw an arc intersecting arc drawn from A, obtaining point B, and draw lines joining A B and B 5. With B as a centre and X 6, X 7, X 8 and X 9 at angles at B as radii, draw arcs intersecting each, as drawn, with arc drawn from last obtained point; the radius of this arc being one division of section on A B. When point 9 is obtained, draw a line joining 9 B; with B as a centre and B F as a radius draw an arc; with point 9 as a centre and C B on elevation as a radius draw an arc, intersecting one draw from B, thus obtaining point F. Now draw lines joining B F and F 9. The outline 9 F B A E 1 forms one-half of pattern. To complete as shown, work from F 9, but working back on plan, that is, use F B and 9 B to obtain point C and etc.

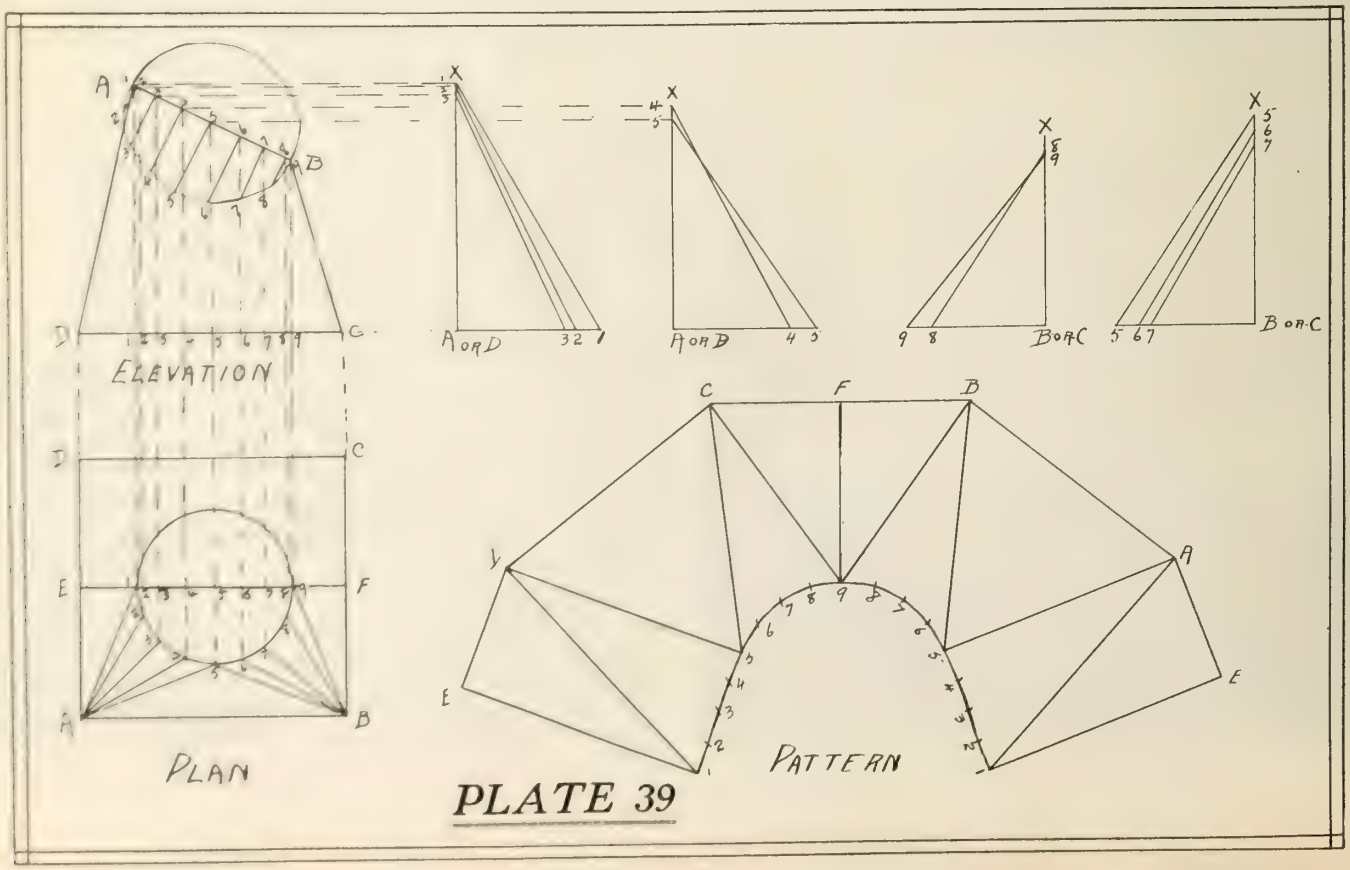


PLATE 39

F. R. Maxwell Elected President

Toronto Selected as Meeting Place in 1917—Reports of Various Committees Presented

IN opening the convention on Tuesday morning, President Russell extended to A. Charette, vice-president of the Dominion Society from the Province of Quebec a hearty welcome and accorded to him the privileges of the meeting.

H. HICKS

Toronto, Honorary Director Ontario Society of Dom. S. & H. Engrs.

The report of the select committee was read by Secretary Frankland. The books were reported as being correct.

R. Coyle moved and A. E. Gibbons seconded that the report be adopted.

Secretary Frankland then read the report of the select committee on the financial report. Secretary Frankland recommended that the accounts of loans made by members of the society should be kept separate from the account for dues. He thought such loans should be paid back by cheque forewarded to members for loans made. He thought the two accounts should be kept separate. The report was referred back to the committee for a recommendation on this point.

The resolutions committee and the membership committee reported on the names which had been submitted to the convention, favorably.

Trustees' Report

The report of the Trustees was then read by the Secretary as follows:

"The endowment fund of the Ontario Society came into existence from a sincere appreciation of the efforts put forth by William Mansell, E. L. Legrow, F. R. Maxwell, C. F. Frankland, R. B. Shannon, in founding and incorporating the Society in September of the year 1911.

"The adoption of the idea as a means of perpetuating the above Society at the annual convention, held in Toronto, March, 1913. The first donation was announced at the annual convention in Toronto, 1914, and trustees appointed. The hope is that the fund will grow by gifts, by bequests and donations, the principal being invested and the interest being used solely for the purpose of forming new local bodies, thereby adding a continual infusion of new blood to the Society, and thereby insuring perpetuity.

"Dec. 28, 1915, at a meeting held in Toronto and called to consider how money could be found to pay current bills of the Ontario Society, at the request of William Mansell, C. Clapperton, F. R. Maxwell, L. Legrow, and G. F. Frankland, and agreed to by E. H. Russell and H. Mahoney, B. Noble and J. Eggett, all being present except the last two, a cheque for $100 was drawn on the trust fund in favor of the Society, the same to be returned, with interest, as soon as the Society is in funds."

London

It was moved by John Eggett and seconded by J. R. Haslett, London, that the above report be accepted.

Report of Nominating Committee

The report of the nominating committee composed of John Eggett, J. R. Haslett and C. Y. Grinyer was then presented as follows, with the following names presented as the officers for the ensuing year .

President, F. R. Maxwell, Toronto; Vice-president, F. H. Gentle, Toronto; Treasurer, Thomas Maxwell, Toronto; Secretary, C. F. Frankland, Toronto; Honorary Directors, E. Lewis Legrow, William Mansell, F. R. Maxwell, George Clapperton, H. Hicks, all of Toronto, E. H. Russell, London; Auditors, George Ross, Brockville; Fred. Smith, Guelph; J. R. Haslett, London; Trustees, E. H. Russell, London; H. Mahoney, Guelph. Chairman of Committees, Sanitary, R. McG. Coyle, Chatham; Heating, B. Noble, London; Arbitration, H. S. Brown, Brockville; Legislation, Angus McDonald, Stratford; Apprenticeship, H. E. White, Brantford; Educational, Geo. E. B. Grinyer, Guelph; Examination Board, the Directors.

L. LEGROW

Toronto, Hon. Director of Ontario Society of Dom. S. & H. Engrs.

We futher recommend that Toronto be the next place of meeting.

It was moved by J. R. Haslett, London, seconded by R. McG. Coyle, Chatham, that one ballot be cast in favor of adopting the report and naming the officers as recommended by the committee.

Report of Resolutions Committee

The resolutions committee, composed of J. E. Fullerton, R. McG. Coyle, Geo. E. B. Grinyer reported as follows:

ANGUS McDONALD

Stratford, Newly Appointed Chairman of the Sanitary Committee.

Your committee recommends that the following applications for membership, which have already been presented for your approval, be accepted:

H. Aked, John W. Oram, Sheppard & Abbott, Kenneth Allison, C. R. Baker, William J. Hall, C. Trickey, W. G. Cameron, S. H. Adamson.

Re the President's report, your committee notes with a great deal of satisfaction that the work accomplished by the committee in charge of the Compensation Act was attended with certain favorable results, and the said committee is deserving the thanks of the Society for their endeavors. We are in accord with the suggestion of the President that it is more beneficial to have a secretary elected from the same locality as at least the majority of the Board of Directors.

We also coincide with the views of the President that the logical place for the headquarters of this Society is in Toronto, and would suggest that the convention take this matter into serious consideration.

In reference to the clause relating to the balance sheet, we feel assured that the Auditing Committee will satisfy the members as to the correctness of same, and will also suggest a proper remedy to overcome the objectionable features.

We deplore the fact that it was thought necessary to discontinue the salary of our secretary after October 1, 1915, and we are confident that this drastic action was not taken without every effort being put forth by the directors to continue him in office, and we hope that Secretary Frankland will be properly compensated for all his services to this organization.

Respectfully submitted,

J. E. Fullerton
R. McG. Coyle
Geo. E. B. Grinyer

Tests of a Spencer Self-feeding Steam Heater

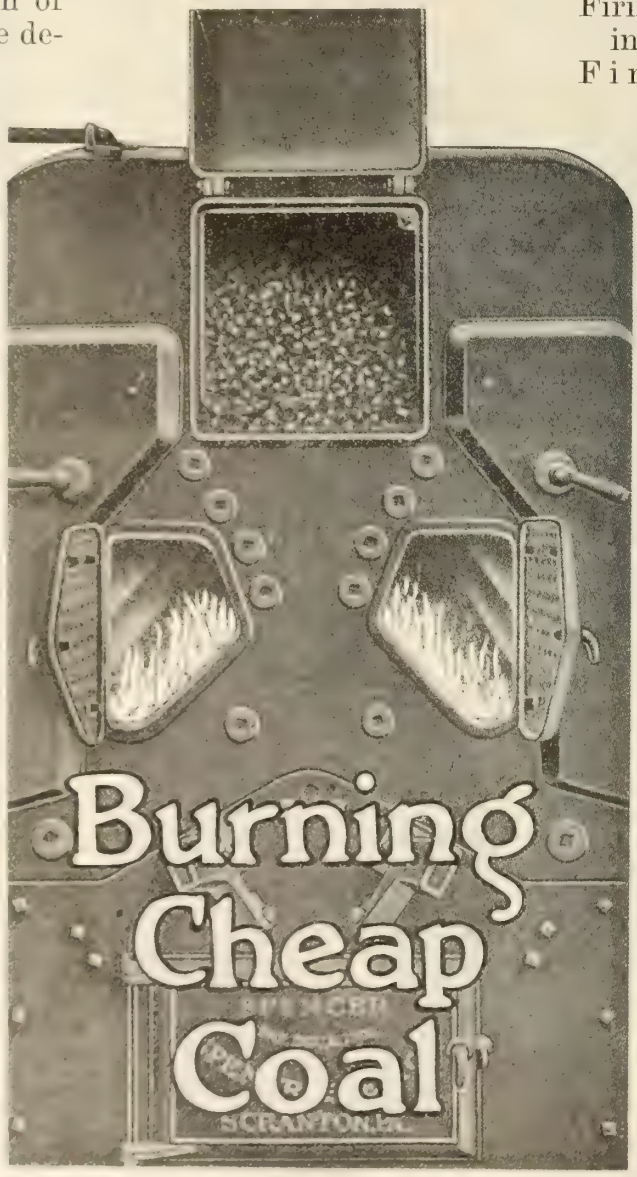
The following article is the result of an independent scientific test made at Mason Laboratory of Mechanical Engineering as a part of the study of combustion in residence heating boilers, carried out under the general direction of Dr. L. P. Breckenridge, professor of mechanical engineering

By E. H. Lockwood, Assistant Professor of Mechanical Engineering, Sheffield Scientific School, Yale University.

THE principal feature of the heater here referred to is a reservoir or magazine from which the fuel feeds down over the grates by gravity. The successful action of the furnace depends on the design of both the reservoirs and the grates, in this heater the grates are inclined like the sides of a flat letter A, placed symmetrically under the magazine, all arranged as shown in small cut.

The fire is started on the grates, and notwithstanding the stored fuel above, the fire shows no tendency to enter the magazine. The gases pass through short tubes to the front, thence through tubes to the rear, providing effective heating surface.

The fuel best adapted to magazine feed is a small size anthracite coal, such as No. 1 buckwheat. The larger sizes, pea and chestnut, also broken coke, can be used in emergencies, but the small fuel is preferable on account of its cheapness and better feeding qualities.



Firing Period.

The entire contents of the magazine can be used up without any attention either to shake the grates or to spread the coal. The following table gives the principal data regarding the firing period of a small-size heater:

Maker's rating	700 sq. ft.
Water heating surface	123 sq. ft.
Grate surface, projected area	4.7 sq. ft.
Magazine capacity at one firing, buckwheat, coal	350 lbs.
Rate of combustion per hour at rating.	20 lbs.
Firing period at rating	17.5 hrs.
Firing period at 150% rating	11.5 hrs.

Numerous tests made with coal bought in New Haven have demonstrated that the fuel will feed over the entire grate surface, maintaining a steady fire without danger of burning out or clinkering for the periods indicated above. To secure these results it is necessary to clean the fire thoroughly with the magazine empty before firing new fuel. If the ashes are partially removed by simply shaking the grates with fuel in the magazine, the feed is liable to be interrupted by clinkers, requiring assistance to bring down fresh fuel from the magazine. It is necessary, therefore, for the attendant to learn the proper method of cleaning the fire to secure perfect feed over long periods.

Economic Performance

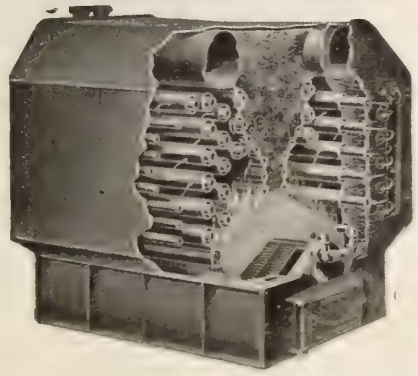
The boiler efficiency of the magazine heater just described is somewhat less than the efficiency found in flat-grate heaters of the best makes. This

conclusion has not yet been confirmed by tests of other magazine heaters and possibly it may be true only of this particular unit. Our tests have shown uniformly a slightly lower efficiency, in spite of a boiler with ample heating surface, with a fire covering the whole grate all the time and a low flue temperature.

These facts indicate a **lower furnace temperature** and hence necessarily a lower efficiency. Clinkers are an index of high temperature, and their absence in the magazine furnace is a fair indication regarding temperature conditions. The loss of efficiency in the magazine heater may be considered as the price paid for the convenience of long-firing periods without attendance.

The foregoing paragraph gives an erroneous idea of the real efficiency of the magazine heater, considered from the standpoint of cost of producing heat. The loss of efficiency in burning coal, assuming this loss to exist, is offset many times over by the ability of the magazine heater to burn the small sizes of fuel, whose cost is approximately one-half that of the larger sizes. The magazine heater can, therefore, claim a good showing on two important points, convenience and economy.

Spencer Tubular Steam Heater



Showing Fire and Water Ways

Boiler Rating.

The boiler referred to in these tests was rated at 700 sq. ft., and this capacity was secured when burning only 4¼ lbs. of coal per square foot of grate area per hour. With good chimney draft it was possible to double this rate of combustion while the boiler efficiently remained unchanged or even slightly better. If the rating of this boiler were increased 50% it would operate on a firing period of 12 hours with slightly increased economy of fuel.

The makers have erred in under-rating this magazine heater, being influenced perhaps by the practice of manufacturers of other types of heaters. Better results will be obtained by operating magazine heaters at higher rates of combustion, reducing first cost of installation, and, at the same time, increasing the fuel economy.

SAMPLE TEST OF MAGAZINE STEAM HEATER

1.	Date of test	Dec. 28, 1915
2.	Duration of test	26.15 hrs.
3.	Water heating surface	123 sq. ft.
4.	Grate area, projected	4.7 sq. ft.
5.	Kind of fuel	Yard pea, equivalent to No. 1 buckwheat
6.	Weight of coal fired (two firings)	693 lbs.
7.	Average firing period	13 hrs.
8.	Ash and refuse in coal	15.4%
8a.	Ash in coal by analysis	9.87%
9.	Total weight of water fed to boiler	6080 lbs.
10.	Moisture in steam, by separator	0.4 of 1%
	Hourly Quantities.	
11.	Coal burned per square foot of grate per hour	5.47 lbs.
12.	Equivalent evaporation per hour from and at 212° F.	240 lbs.
	Pressures and Temperatures.	
13.	Average steam pressure by gauge	5.5 lbs.
14.	Average temperature of feed water	185 F.
15.	Average temperature of flue gases	265 F.
16.	Average draft	0.11 in.
	Capacity.	
17.	Makers' Rated capacity	700 sq. ft.
18.	Boiler capacity during test	960 sq. ft.
19.	Per cent. of rating developed	137
	Economic Results and Efficiency.	
20.	Water fed to boiler per pound coal as fired	8.78 lbs.
21.	Equivalent exaporation from and at 212° per hour per pound of dry coal	0.27 lbs.
22.	Calorific value of dry coal	13,800 B.T.U.
23.	Over-all efficiency, based on dry coal	66%

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J. R. Haslett moved and G. E. B. Grinyer seconded that the work done by individual members in connection with the Workmen's Compensation Board receive the recognition of the convention and that they be accorded the hearty thanks for the valuable services which they performed in that connection.

J. R. Haslett moved and John Eggett seconded that the various clauses of the resolutions committee be accepted as reported, which was adopted.

At this point Sergeant-at-Arms, A. Holland begged the permission of the convention that the auditing committee be allowed to make a report. John Cunningham, Paris, on behalf of the auditing committee thereupon with measured tread and true stepped forward to take advantage of the opening thus afforded, when the convention had duly extended the privilege.

Report of Auditing Committee

The report of the committee, composed of John Cunningham, Paris; A. E. Gibbons, London; H. Aked, London, was then read by Secretary Frankland as follows:

Gentlemen,—We have audited the secretary's books and find everything satisfactory. We would suggest, regarding the trust fund, that the loan of $100 should be paid back, and also that the members who made small loans should be paid back, and that a greater effort be made to collect the outstanding dues.

We would further recommend to the incoming Executive that all members in arrears for one year be at once struck off the roll. It is better to have twenty members in good standing than one hundred owing and causing the secretary all kinds of trouble.

John Cunningham
A. E. Gibbons
H. Aked

In moving the adoption of the auditing committee's report, Ben Noble, London, said he thought the report should certainly be adopted. "If members are unable to pay this year how are they going to be able to pay next year?" he asked. "This laxity about the collection of dues has been our downfall. It has been our course. I think the incoming Executive should be impressed with the advisability of having each member pay his dues promptly. There is no use trying to run the Society on a membership that comprises eight or ten in each centre who are in arrears in their dues.

Ben Noble cannot see how an association can be run on credit and strongly urges that members pay up or get out, preferably not the latter.

Secretary Frankland read an extract from the by-laws of the Society showing that it was already provided that members were out of good standing when they were six months in arrears with their dues and that all that was required was a motion of the meeting to suspend those members thus in arrears from membership in the Society.

Mr. Noble thought the Secretary should be censured (or hung) for not suspending the members who were already in arrears if he was so empowered by the by-laws. President Russell pointed out that the present method of procedure was really in order. He explained that while members were out of good standing after being six months in arrears with dues that it really required a motion from the membership of Society to suspend those members.

Ben Noble: In that case I would have the Society go still further by amending the by-laws so that members who are six months in arrears would become suspended automatically. "It is far better to have only fifteen members who are active and interested to the extent of paying their dues than to have hundreds who will not pay their dues," stated Mr. Noble.

J. R. Haslett pointed out that members who are kept on the books after they are in arrears must have a per capita assessment paid for them by the Ontario Society to the Canadian Society. "We have had to pay for them when they are in reality dead," said Mr. Haslett.

President Russell read the Articles of Agreement entered into between the Toronto branch of the Domestic Sanitary and Heating Engineers and the Journeymen Plumbers and Steamfitters Association of that city. These were filed for reference. Such agreements are to be left as purely local matters with the organizations affected.

Report of Select Committee

The Select Committee has examined the books and correspondence as far as time will permit and find same correct.

We would suggest that the Select Committee be appointed, if possible, at an earlier stage of the proceedings in future, in order that all the work may be gone into more thoroughly.

Thomas Maxwell
J. R. Haslett

Letter from Enlisted Member

A letter was read by Secretary Frankland from F. Sainsbury, Weston, Ontario, stating that he had enlisted with the Canadian forces and that he desired his membership to be held in abeyance. His letter follows:

Weston, May 15, 1916.

P. F. Frankland,
Secretary Ontario Society,
Toronto, Ont.

Dear Sirs,—Please note that I have enlisted with the Canadian Expeditionary Force and am leaving Toronto May 16. I would wish my membership of the Ontario Society to be held in abeyance. Trusting in the near future to be with you again, I remain

Yours truly,
F. Sainsbury.

JOHN McKINLEY, Ottawa.

H. MAHONEY, Guelph.

On motion of B. Noble, London, and E. Holland, London, it was decided that Mr. Sainsbury be kept on the books in good standing until the end of the war. A standing vote was taken showing the appreciation of the services which Mr. Sainsbury had given to the association in the way of loans from time to time.

A letter was read from Mayor Harry Mahoney of Guelph, Ont., expressing his regrets that he was unable to be present at the convention. Mayor Mahoney explained that he had just returned to his duties at his office after having his leg broken in two places in March of this year. He is still walking with the aid of crutches.

To Press for Passage of By-Law

Secretary Frankland thought that a recommendation should go forward immediately to the Provincial Board of Health asking that the preparation of the Ontario plumbing by-law be undertaken immediately. J. R. Haslett moved and R. McG. Coyle seconded that the matter be brought to the attention of the incoming executive and directors of the advisability of laying this matter before the provincial Board of Health immediately and urging that the drafting of this by-law be undertaken without delay.

Accorded Freedom of Meeting

A. Charette, vice-president for Quebec in the Canadian Society, was present at the Tuesday morning session and was welcomed to the meeting by President Russell. In replying Mr. Charette said he was unable to speak English very fluently but he was glad to say that he was living under the British flag. "I thank you for the privilege accorded to me in granting me the freedom of this convention and I shall convey to my partners the reception which you have accorded to me."

Sweet Memories of the night at Port Stanley. "Sir Robert Casement" sings his last song.

Entertainment Outlined

President Russell then outlined the entertainment features that had been provided for the members during their stay in London. J. R. Haslett stated that the Empire Brass Manufacturing Company had extended an invitation to the members to visit their works and that the company would place autos at the disposal of any ladies who might be in the party to convey them to the works. The thanks of the society was expressed to T. A. Stevens for his offer and it was decided that the members should visit the works in a body on Thursday morning.

John Cunningham, Paris, moved and Secretary E. F. Frankland seconded that a hearty vote of thanks be extended to the entertainment committee for the ample provision they had made. B. Noble, as chairman of the entertainment committee of the Canadian Society, further outlined the provision that had been made for the entertainment of the visiting members. "We want to show you what a fine rapid electric line we have to Port Stanley this evening. So rapid is it that we will leave here at 6.20 this evening and will be in Port Stanley, 23 miles away, at 6.20 o'clock the same evening," stated Mr. Noble.

The meeting then closed with the hearty singing of Auld Lang Syne and the National Anthem.

INTERESTING HEATING CHARTS

The Vici Radiator Company, 6 John St. N., Hamilton are issuing a set of very useful and interesting heating charts and tables. They are printed on stiff cardboard which adds considerably to their durability. These charts define such subjects as the following:

Estimate of necessary heat units.

Co-efficients for estimating direct radiation.

Comparison between cost of 100 sq. feet 2 pipe system and atmospheric steam heating as well as other information. A postal card will procure a set of these charts.

Left to right—E. H. Russell, London; R. H. Sehl, Waterloo; J. Cunningham, Paris; G. E. Grinyer, Guelph; Jno. Eggett, London; J. Cunningham, Paris, and H. Aked, London.

Sanitary Engineers to Ask for Legislation

Keynote of Conventions of Ontario and Canadian Societies at London, June 19 to 22 Was Determination to Get Powerful Forces to Press for Proper Sanitary Laws and Standardization of Plumbing Materials — Successful Convention

THE outstanding feature of the Convention of the Canadian Society of Domestic Sanitary and Heating Engineers in session in London, Ont., June 20 to 22, was the decision to endeavor to get the insurance, assurance and fraternal societies, the manufacturers of plumbing supplies and the employing plumbers to work in co-operation toward securing legislation that will insure better sanitary conditions throughout the Dominion and to the end that plumbing materials might be standardized in the interests of economy.

The convention at London was a most successful one. While the number of delegates present was not large, still the [illegible] promise of resulting in much good to the trade in general. The social side of the convention and the entertainment provided by the London Society was most complete in every particular. "We felt that we were among friends immediately on our arrival," was the way one prominent manufacturer put it. That spirit prevailed throughout. London civic authorities in the person of the Mayor and Aldermen bade the delegates a hearty welcome to the city.

The President, E. H. Russell, called the officers of the Canadian Society of Domestic Sanitary and Heating Engineers to the platform on opening the convention, Tuesday, June 20. Seated by the presiding officer were John McKinley, Ottawa; Ben Noble, London and C. F. Frankland, Secretary, Toronto. The names of the visiting delegates and guests was then given to Secretary Frankland. Mayor Stevenson was introduced to the gathering and in welcoming the convention to the city of London said:

Mayor's Address of Welcome

Mr. Chairman and Gentlemen: I have much pleasure in welcoming the Canadian Society of Domestic Sanitary and Heating Engineers to the city of London—with a growing city such as London the tasks of a Mayor are by no means light. But I am pleased indeed to be here to extend to you a cordial invitation to make yourselves at home in our city. We have had a great growth in the city of London. Building is going forward and there is not a vacant house in the city. As a growing city we have many problems to face. One of these problems particularly is that of transportation.

"I am always pleased to meet with such men as gather together in conventions for they are the progressive spirits in any community or country. We have been discussing a plumbing by-law for we have come to the conclusion that it is absolutely necessary that some law should be drafted for the guidance of plumbers and steamfitters in the very important work of installing sanitary and healthful systems in our city. I do not wish further to take up your time but I desire to thank you for giving me this opportunity of speaking a word of welcome on behalf of the city of London. I hope you will enjoy your stay in this city. I trust you will take a trip to Port Stanley which is connected with this city by the London, St. Thomas & Port Stanley Railway. This line was built and is operated by the city of London. It means a big thing for this city to have this railroad give connections to the northern shore of Lake Erie. It will make of London more of a distributing centre for this section of Ontario. One railroad that has connections with Port Stanley has already doubled its business into this city.

Left to right—A. Charette, Montreal, newly elected President of the Canadian Society, L. J. Conroy, new Secretary. C. R. Myers, Stratford, newly elected Vice-president. Messrs. Maxwell, Frankland and Fullerton, the Toronto delegates to the Ontario Convention.

Great Island Empire

"When you visit Port Stanley you will see shipping coming into that harbor which has never been known there before. Port Stanley is the only harbor that is of any consequence on the northern shore of Lake Erie and it will be the port of London for the shipping on the Great Lakes. Around these inland lakes of North America is being built the greatest Empire in the world. The people on the north and south sides of these great lakes sprang from the same stock and we will here build a greater Empire than has been. We welcome you to this portion of that coming Empire."

Alderman Little as chairman of the reception committee of the City Council of London also welcomed the visitors to the city. "We are glad to have you here, particularly on the occasion of your coming of age as a society. We hope it will be sufficiently interesting that you will want to come back again," said he.

John McKinley, Ottawa, and A. E. Gibbons, London, were the mover and seconder of a motion thanking the Mayor and Alderman for their cordial welcome extended. A standing vote was taken to show the unanimous approval of the members.

Oxygen Will Purify Sewage

R. O. Wynne-Roberts, consulting engineer, of Toronto, was present at the opening session and gave a short tddress on the scientific disposal of sewage. "My experience in this line has extended over a period of 33 years," said Mr. Wynne-Roberts. "In that time I have

seen many changes. One of the modern developments for the scientific disposal of sewage is the mixing of oxygen with the sewage sludge and in this way reducing the number of microbes by a process of purification. It is possible with an activated sludge to thoroughly purify the sewage. By a constant mixture of oxygen with the sludge in the course of six weeks it is possible to oxidise and purify the original water into a fairly pure state. The sludge that remains becomes exceedingly good as a fertilizer. Sewage which is then discharged into a running stream after the process is completed has no more than five per cent. of the original microbes. Had it not been for the retarding influence of war conditions I doubt not but that the question of the scientific disposal of sewage by this oxidization method would have been an important question all over the civilized world.

New Duty to Mankind

"The question of a water supply is also a most important factor in the health of the people. I am not in favor of the chlorination process of purifying water if it can at all be avoided. Pure water is a most important element in all our daily activities. It is a great pleasure for me to be with you to say a few words. I think on this occasion of the attainment of your majority as a Society you could well strike a greater and higher note of efficiency. That has been the keynote and the lesson of this war, for one of the things which dominates all our thoughts has been the efficiency of the Prussians. New conceptions of life, duty, efficiency are dawning and sanitary engineers will have a higher duty to perform in the service of mankind than ever before."

President Russell said that undoubtedly one of the prime matters of importance was that of sewage disposal. "We must conserve our resources by the proper disposal of these waste products. It should be made impossible to pour them into the river to poison people lower down."

A question was asked Mr. Wynne-Roberts if the mixing of oxygen with the sludge was accomplished merely by a continuous flow of air over the sludge or was it mixed through the sludge. Mr. Wynne-Roberts said the air must be pumped through the sludge from underneath. As to the best method of accomplishing this that is now the subj,ect of investigation.

A vote of thanks to R. O. Wynne-Roberts was moved by C. F. Frankland and was seconded by A. Charette of Montreal. President Russell then delivered his opening address to the convention.

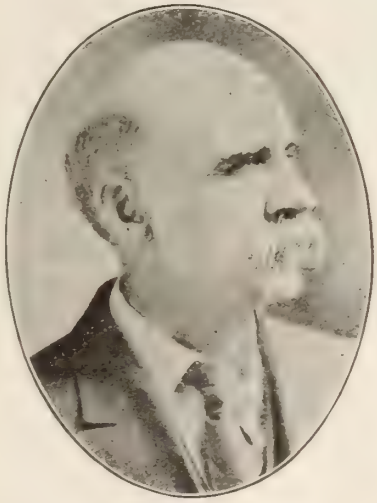
Need To Be Squeezed Into Action

President of Sanitary Engineers in Report to Annual Convention Shows Necessity of Powerful Influence Being Brought to Bear on Legislators in Interest of Effective Sanitary Laws

IN addressing the Convention of the Canadian Society of Domestic Sanitary and Heating Engineers at their opening session in London, Ont., on June 20. President E. H. Russell pointed out the great need for three interested parties to get together in a concerted effort for the attainment of proper and adequate laws pertaining to the health of the people. He said:

To the Officers and Members of the Canadian Society of Domestic and Sanitary and Heating Engineers:

Gentlemen: It is usual to make a summary of the work accomplished during the term of office, the amount of business coming before the officers has been small. Either the provincial societies have been greatly affected by the war or the various subjects such as requesting that the Minister of Public Works to require that all tenders for heating, plumbing, etc., shall be separate from bulk contracts, direct selling, legislation requiring examination of masters and journeymen and kindred subjects have lost their zest by reiteration. While encouraging progress has been made along these lines the last being the securing the amendment to the Public Health Act relating enactment by the last session of the Ontario House. In going over the work of the various conventions for the past few years it is noticeable that the same questions continually arise and that with such persistency that one feels that there must be some other method calculated to secure better and more permanent results. The first question naturally is: Why do not the legislators take up and decide the question of national health so far as it is affected by want of proper sanitation at least? Surely the health of a nation is its one great asset. Health is wealth, all will admit. We hear of governments spending huge sums to stamp out hog cholera, foot and mouth disease, etc., and very rightly too. But does the human receive a proper proportional amount of consideration? and if not why not? There is apparently but one answer: the powers that be do recognize the necessity of the maintenance of the public health and its conservation and will enact those regulations which are so necessary just as soon as sufficient pressure is brought to bear on these matters. And then there is always a vast amount of governmental business to transact that only those matters which cannot be shelved or pigeon-holed, or "receive the usual careful consideration" which we so often hear about and which are never taken up to a conclusion. If this is so, obviously the second question will be: How can the necessary pressure be obtained if it is not contained within this society itself? Surely it is through co-operation with others having similar objects in view. And there are three organizations at least—powerful, rich and influential enough to go to the Dominion government and speedily secure legislation which will standardize



E. H. RUSSELL, London.

material and installations and other essentials throughout the country.

These influential bodies are the insurance, assurance and fraternal societies in one group, manufacturers of sanitary appliances in group two, and those that install sanitary appliances forming group three. Just think what would happen if a fractional part of the money spent by the life insurance people in publishing guides to health, monthly bulletins, maintenance of nurses, etc., and the manufacturers in advertising goods the use of which is the common necessity of all. If this fractional part, theirs and our united effort were brought to bear in the direction indicated Canada would be looked upon as a model for other nations to pattern by and be noted for its public comfort stations throughout the continent. I commend the foregoing to your consideration. The idea is capable of extension by each individual member of this Society. For every prudent man is personally interested in all of the organizations mentioned.

Respectfully submitted.

E. H. RUSSELL.

On motion of J. McKinley, Ottawa, and B. Noble, London, the President's report was referred to the resolutions committee to take what action they may deem advisable in view of the recommendations made therein.

Entertainment Outlined

B. Noble, London, in outlining the entertainment features of the convention said that he was glad indeed to see the cordial relations which have existed between the manufacturers and the sanitary engineers during the past year. "They have been exceedingly cordial during the past year and the relations are in a much better state than a year ago when the convention met at

St. John. The manufacturers have been doing pretty near what is right, and we thank them for the generous contribution to the entertainment fund of this convention. It is our purpose to see that all are thoroughly entertained. This evening we will take you on a little jaunt to Port Stanley where you will see the greatest fishing fleet on Lake Erie. After the banquet there we will come home when we get through. For Wednesday afternoon there will be sports and we advise all you old vets to get some witch hazel and rub up your joints for the prizes will be worth competing for. In the evening at the Tecumseh house Peter McArthur, one of the best known speakers and humorists in Canada will be the principal speaker. In an auto drive around the city we will show you one of the prettiest cities in the world. I have travelled from coast to coast and I know there is no other city quite as pretty as London, Ontario."

The report of Vice-president A. Charette of Quebec on the recommendations of the Montreal branch for amendments to the by-laws was then read. This report was as follows:

Proposed Amendments to Constitution.

Amendments to the Constitution and by-laws of the Canadian Society of Domestic, Sanitary and Heating Engineers proposed by the Master Plumbers' Association of Montreal and vicinity, to be presented at the National Convention to be held in London, Ont., on June 20, 21 and 22. Delegates: Messrs. Charette and Conroy:

1. That after the word "association," in the seventh line of By-law No. 2, this sentence be inserted: "In the case of the annual meeting, proposals for amendments to the By-laws shall be proposed in writing, and shall be in the hands of the secretary-treasurer at least three months before the first day of the annual meeting, and a two-thirds majority shall be required for their adoption, and no amendment to the By-laws shall be considered by the annual meeting unless a copy of it has been in the hands of the secretary of each local association at least two months before the first day of the meeting at which it is to be considered." Nothing in this article shall prevent a change in the by-laws, provided the same is carried by a unanimous vote of the members at a regular session.

3. That the word "association" be withdrawn from the following articles of the Constitution and By-laws, and the word "society" inserted: Constitution, Art. 2, Art. 10, Art. 14, Art. 16, Art. 17, Art. 18, and Art. 20; and By-laws 1, 2, 3, 5.

4. Insert in the By-laws a new clause 17 (a), reading as follows: "It shall be the duty of each local or provincial association to forward to the secretary of the Canadian Society an annual report which shall state, inter alia, the number of members in good standing with the name and address of each firm. This report must be in the hands of the secretary of the Canadian Society at least sixty days before the annual meeting. Each local or provincial association shall forward to the Canadian Society the amount of their per capita tax within thirty days of the annual meeting. In the event of this amount not being received within fifteen days before the annual meeting the Canadian Society will make draft for such amount, and the amount will be drawn in accordance with the last returns made by said local or provincial society."

GEO. S. DORMAN
Moncton, Chairman of Essay.

Vice-President Charette's Report.

To the President and Members of the Canadian Society Domestic, Sanitary and Heating Engineers:

Gentlemen,—At the moment of writing this I regret to state that the reports of the convention held at St. John, N.B., in June, 1915, has just been received. The delay in the publication of this report has prevented me from completing, in a satisfactory manner, which it would have been my duty and pleasure to perform. Nevertheless, I flatter myself that I have accomplished something which would have been more fruitful had the report of our last convention been made and published earlier.

During the past year the members of my committee met several times, and after having seriously considered several questions pertaining to the by-laws and constitution of the Canadian Society of Domestic Sanitary and Heating Engineers, reported their decisions to the Montreal Association. The members of the latter, having discussed and accepted these proposed amendments, have authorized their delegates to take the necessary steps to secure their adoption.

I have procured copies of the sanitary by-laws of the principal towns of Canada and the United States, and I have pleasure in acknowledging that the secretaries of the various cities with whom I communicated favored me by sending the necessary documents. These have been studied attentively, and the members of the committee have drafted some amendments, which have been added either wholly or partly, and which have been submitted to the association at Montreal and to the authorities of the city. These amendments have been supported before the sanitary department of Montreal by three of our associations, and have been adopted by the city. There only remains to give them the necessary legal form, and the city lawyer has been charged with this duty.

Since the last convention I have written to the authorities of many towns to obtain the addresses of the master plumbers in their districts; my letters have not been answered.

My intention was to endeavor to recruit as many members as possible, but I regret to state that I have not succeeded. What method shall be adopt to enrol under the banner of our Society the master plumbers of the principal cities? The subject ought, it seems to me, to receive every attention from the members of this convention. In my humble opinion the Society ought to have an organizing secretary in each province. This organizer would organize every master plumber of the various districts. I submit this suggestion for your consideration. Is it not worthy of your attention?

JOHN E. GODWIN
Halifax, Provincial Vice-president for Noca Scotia.

I cannot conclude without acknowledging with pleasure the ever-ready assistance which the members of my committee have given me, and am glad of the present occasion to tender them a cordial and fraternal thanks.

Respectfully submitted,

ALEX. CHARETTE,
Vice-President for the Province of Quebec.

Report of the Apprenticeship Committee.

To the officers and members of the Canadian Society Domestic, Sanitary and Heating Engineers:

Gentlemen,—We, your Apprenticeship Committee, beg leave to submit for your approval this report for the twenty-first annual convention. In looking over several of the past annual reports of the Apprenticeship Committee, we find that this committee has from time to time been giving very valuable advice from time to time to the annual conventions, but nothing has been done to improve the training of our apprentices. We endorse the remarks on page 23 of the last annual report, submitted by Mr. George Clapperton, Toronto, and advised technical school training.

We would recommend that this question be taken up by the local society and some uniform agreement brought into force which would be binding on the master as well as the apprentice, along the following lines:

Each apprentice shall be at least six months in the employ of an employer before he shall be indentured. The apprenticeship shall be for a term of five years, no apprentice to be less than sixteen years of age, and to be able to read and write in either French or English.

The apprentice who has studied two terms with any recognized technical school and can produce a certificate to that effect would be allowed six months' reduction, making his term four and one-half years.

We would recommend that a retainer be held by the employer of say fifty dollars a year for the first three years, making one hundred and fifty dollars, this sum to be paid to the apprentice at the end of the fifth year.

All lost time exceeding two weeks in each year to be made up in the following year at the same rate of wages as the previous year.

Masters must do all in their power to afford the apprentice every opportunity in gaining a knowledge of the trade, allot him

certain hours in each week for practice in his shop.

Make scale of wages for first, second, third, fourth and fifth years, all overtime to be paid for at the same rate as men, namely, time and one-half and double time.

Apprentices should not belong to any labor union. There should also be a card system, so that an apprentice could finish his time in another shop in the event of his employer going out of business or other unforeseen causes.

All respectfully submitted by your committee,

J. E. Walsh
Lawrence J. Conroy
Joseph Laurier
John Watson

The report of Vice-President Charette and of the Chairman of the Apprenticeship Committee were received and passed on to the resolutions committee for action on motion of J. McKinley, Ottawa, seconded by D. Noble, London.

The recommendations respecting amendments to the Constitution and By-Laws proposed by the Montreal branch and locals in that vicinity on being presented to the meeting by President Russell were passed to the Resolutions Committee for action.

London Executive to Ask Co-operation

Matter of Drawing Together Powerful, Interested Parties in Question of Sanitary Laws and Standardized Materials Left With London Society — Resolutions Adopted by Convention

THE Convention of the Canadian Society of Domestic Sanitary and Heating Engineers got down to constructive deliberations on the report of the Resolutions Committee being presented. It was decided to have the question of securing co-operation by insurance and fraternal societies, manufacturers and master plumbers in the hands of the London Society. This action was preceded by the reports of the Resolution Committee on the various subjects presented to the Convention.

Report of Resolutions Committee

The report of the resolutions committee, composed of Lawrence J. Conroy, Montreal, chairman; and J. E. Fullerton, Toronto, and Geo. E. B. Grinyer, Guelph, embodied the following:

Your committee would recommend that a special committee be appointed to look into the matter in keeping plumbing and heating contracts separate from the general contract. And at the same time to inquire why the promises by the Minister of Public Works were not lived up to.

Direct Selling.—With respect to direct selling we suggest that a standing committee be appointed from different districts which would be empowered to investigate any grievances which may arise in their locality.

Your committee understands that the Ontario Society has already placed the question of provincial supervision of all sanitary systems before the Ontario Government and would recommend that the other provinces do likewise.

JOHN WATSON
Montreal, New Chairman of Apprenticeship Committee.

We are at a loss to suggest a forcible method of placing the ideas set forth in the President's report re the Public Health Act before the proper authorities, but feel that a set of articles published in our Trade Journals along these lines would be a step in the right direction.

Vice-President's Report.—Your committee feels that the grievance of the Vice-President of Quebec that the annual report was not delivered in sufficient time to enable him to obtain the best results was unfortunate. We would recommend that the annual report be published within thirty days after the close of the convention each year.

In respect to the appointment of an organizing Secretary for each province your committee feels that an effort should be made to organize provincial associations according to the aims and objects of this body.

We would commend the very good work which has been accomplished by the Vice-President for Quebec, Mr. A. Charette, and in the very able manner which he presented his report.

Recommendations from Montreal Association.—We further recommend that the amendments to the Constitution and By-Laws as proposed by the above association and already placed before this convention be adopted.

Apprentice Committee Report.—While your committee realizes that the apprentice question is a very important one and that an indenture would be beneficial to the members of our Society, we feel that owing to present conditions this matter can be dealt with to best advantage by each local association.

J. E. FULLERTON,
GEO. E. B. GRINYER,
LAWRENCE J. CONROY,
Chairman.

Books Found to be Correct

The Select Committee composed of Messrs. R. McG. Coyle, Thomas Maxwell and John Cunningham reported that the books and vouchers of the Society were correct. The report follows:

Gentlemen: Your Select Committee begs leave to report that we have examined the books and vouchers of the Secretary and Treasurer and find same to be correct according the statement herewith presented.

R. McG. COYLE.
THOS. MAXWELL.
JOHN CUNNINGHAM.

Sports at Springbank Park. Left to right—(1) Two-legged Race. (2) Jno. McKinlay, Ottawa, makes a big drive which resulted in a home run for the Sanitary Engineers. (3) Wheelbarrow Race.

Sanitary Engineers, Manufacturers and Supplymen in attendance at the recent Annual Convention held in London, Ontario.

Appreciation of Former Secretary

In opening the Wednesday morning session President Russell referred in a fitting way to the death of L. H. Estano of Moncton, chairman of the Essay Committee and Secretary of the Society during the years 1914-15. President Russell spoke in an appreciative manner of the good work which Mr. Estano had accomplished for the Society by way of collecting dues and in assisting the work of the Society in other ways. He thought the occasion should not pass without due recognition being taken by the Society. The minute was ordered to be spread upon the records of the Society.

Credentials Found in Order

The report of the Credentials Committee was presented to the Convention and the following names of members were reported as being duly accredited delegates from their various branch organizations:

E. H. Russell, London, President; Ben Noble, London, Secretary-Treasurer; A. Charette, Montreal, Vice-President for the Province of Quebec; Lawrence J. Conroy, Montreal; Thomas Maxwell, Toronto; John E. Fullerton, Toronto; Garrett F. Frankland, Toronto; John McKinley, Ottawa; T. Minnes, Brantford; John Eggett, London; T. Rich, London; A. E. Gibbons; H. Aked, London; E. Holland, London; C. Needham, London; J. R. Haslett, London; John Cunningham, Paris; J. J. Robb, Stratford; W. F. Rodgers, Stratford; Geo. E. B. Grinyer, Guelph; R. A. Sehl. Waterloo; R. McG. Coyle, Chatham; Clone R. Myers, Stratford.

It was moved by A. Charette, seconded by L. Conroy, that the report of the Select Committee appointed to examine the books and vouchers be accepted. This was carried.

Disposal of Recommendations

A committee was named composed of the incoming Executive and A. Archambault of Hull, Que., to look into the matter with respect to keeping plumbing and heating contracts separate from the general contract. This committee will also inquire from the Minister of Public Works why the promises respecting the bulk contract had not been lived up to. John McKinley, Ottawa, thought it was well to let the Minister of Public Works at Ottawa know that the Society had not overlooked his failure to keep his promises.

Grievance Committee for Each District

The recommendation of the Resolutions Committee that there be a standing committee appointed from different districts who would be empowered to investigate any grievances which may arise in their locality was changed on motion of R. McG. Coyle and C. R. Myers so that the Executive Committee would be empowered to name a grievance committee in each locality wherever such grievance might arise. This grievance committee would use all means in its power to settle the points at issue and report to the central executive. This motion was adopted.

The recommendation of the Resolution Committee that all provincial branches of the Society should press for the provincial supervision of all sanitary systems, the same as is now being done in Ontario, was adopted by the Convention.

The London Executive was given power to follow up the suggestion made by President Russell in his annual report that an endeavor should be made to secure co-operation on the part of the various insurance, assurance and fraternal societies, the manufacturers of plumbers' supplies and the employing plumbers toward the purpose of securing legislation which will standardize materials and installations and other essentials throughout the Dominion.

John McKinley of Ottawa thought it a most important thing to pursue further in an endeavor to get effective legislation. He was of the opinion that the London Executive was the logical one to take the lead to the end of co-ordinating the activities of the various interests named by President Russell. President Russell intimated that he proposed to start the ball rolling by getting the London insurance companies interested in the matter.

Each Province Should Do Its Own Organizing

The recommendation of A. Charette, Vice-President for the Province of Quebec, that a provincial organizer for each of the provinces should be appointed was disposed of according to the recommendation of the Resolutions Committee that an effort should be made to organize the provincial associations according to the methods laid down by the Constitution and By-Laws. It was decided that each province should look after its own organisation work.

The good work of A. Charette of Montreal as Vice-President for the Province of Quebec was unanimously concurred in by the convention.

By-Law Amendments Carried

The amendments to the By-Laws and Constitution as proposed by the Vice-President from Quebec were carried on motion of T. Maxwell, Toronto, seconded by Geo. E. B. Grinyer of Guelph. A new edition of the Constitution and By-Laws was ordered to be printed. One change was made in the proposed amendments to the By-Laws which made it necessary for a two-third vote of the members present to change the By-Laws instead of a unanimous vote.

Provincial Societies Make Favorable Reports

P.E.I. Society Running Smoothly

THE report of D. R. H. Shaw, vice-president from Prince Edward Island, showed that matters were working smoothly and harmoniously in that province. His report follows:

Charlottetown, P. E. I.,
June 15, 1916.

To the President and Members of the Canadian Society of Domestic Sanitary and Heating Engineers:

Gentlemen: I submit herewith my report for the year 1915-1916.

All the plumbing and heating firms in this Province are members of our association and find the benefits of co-operation. Although we had some little friction amongst some of our members during the past year I am glad to be able to report that the difficulties have been all cleared away and that our Society is now running smoothly and harmoniously. The building trade not being as good as in former years owing to the war conditions, we therefore feel the effects of same to some extent.

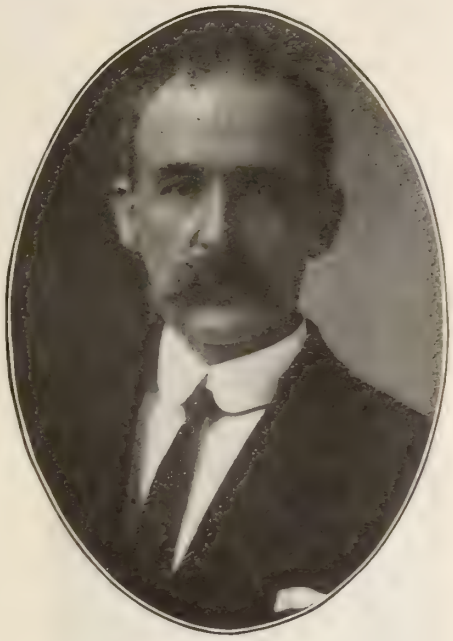
I regret to report that none of our members can find it convenient to attend the Convention at London this year, but I feel confident that it will be a success and a benefit to all concerned.

Yours truly,
D. R. H. Shaw.

Firms Doing Business in P.E.I.

The following list of firms doing business in Prince Edward Island was appended to Mr. Shaw's report:

Bruce Stewart & Co., Charlottetown; Stanley, Shaw & Pearden, Charlottetown; Currie & Murnaghan, Charlotte-Town; Fred H. Trainor, Charlottetown; James McEachern, Charlottetown; Thomas Johnson & Co., Summerside; Morrison & McDonald, Summerside; Johnson & Callbeck, Summerside; En-



JAMES MARR

Calgary, Provincial Vice-president for Alberta.

closed find check for $8.00 amount per capita.

Yours truly,
D. R. H. Shaw

On motion of T. Maxwell and John Eggett the report was received.

Saskatchewan Report

The report of N. B. Roantree of Swift Current, Vice-president for Saskatchewan, was then read by Secretary Frankland and on motion of L. J. Conroy and C. R. Myers the report was received. It was noted with interest that the council of Swift Current was now compelling all property owners to connect up with sewer and water mains. The report follows:

Swift Current, June 14, 1916.

B. Noble,
Sec.-Treas. C.S. of D.S & H.E.
London, Ont.

Dear Sir: Your allotment of reports of the twentieth annual convention came to hand a couple of weeks ago. Although as yet we have been unable to get our Provincial association going we have reorganized our Local and I am pleased to say it is working in good shape and I believe now that things are taking on a little life in the province we should be able to get a Provincial Association.

I mailed copies of the report to the following: In Regina:—Potts & Smith, Regina Plumbing & Heating Company, Vogg-Wilson, Adam & Coll, Whileford Bros., Newis, McLarty & McDonough. In Moose Jaw—Moose Jaw Plumbing Company, T. P. Bayles, Heggings & Orpwood, Alexander & Baird, Kennedy & Co. In Saskatoon—Northern Plumbing & Heating Co., James Brandon, Beaton & Brady. In Weyburn—J. C. Stewart and George T. Walker. I believe when they read this report through they will see that it will be to their advantage to get organised .

I had hoped to be present in person at the 1916 Convention but it is impossible and I am sorry. I might say that our little city has made a good move in that the Council is forcing all property owners to connect up with sewer and water. It goes to show that they are looking after the sanitary condition of the city. It is a little hard on the poorer classes but the city is considering now the raising of debentures to assist those who are unable to pay for their work, thus enabling them to pay a small portion each year with their taxes.

Trusting that the twenty-first annual convention will be a success, and wish-

Left to right—Sanitary Engineers Baseball Team (the winners). Centre, Bill Rose and Bill Downs on the water wagon? The Manufacturers and Supply Men Baseball Team.

[illegible] be remembered to all my friends. I remain

Yours very sincerely,
N. B. Roantree
Vice-president for Saskatchewan.

New Brunswick Has 28 Members

R. E. Fitzgerald, secretary-treasurer of the New Brunswick Society of Domestic Sanitary and Heating Engineers, reported on behalf of his Society. On motion of T. Maxwell, Toronto, and John Cunningham, Paris, the report was received. It follows:

St. John, N.B.,
June 16, 1916.

G. F. Frankland,
Asst. Sec. C.S. of D.S & H.E.
Toronto, Ont.

Dear Sir: I am enclosing herewith cheque for $28 with fifteen cents added for exchange to pay the per capita on 28 members from New Brunswick.

The New Brunswick Society had a meeting this week and while they felt unable to send a representative they requested me to express their regret at not being with you this year and their best wishes for a very successful meeting.

Business in our line in this part of the country has been very poor this last couple of years and the members could not see their way clear to afford the expenses of sending a delegate to the Convention this year. I hope you have not overlooked the matter I wrote you about on May 22. I have had no reply to it yet.

Again on behalf of the New Brunswick Society wishing you every success I remain

Yours very truly,
R. E. Fitzgerald,
Sec.-Treas. N. B. Society.

Manitoba Report

The report of A. J. Hammond, Winnipeg, vice-president for Manitoba, was presented to the Convention by Secretary Frankland. On motion of John Eggett and C. R. Myers it was received. It was as follows:

Winnipeg, June 15, 1916.

C. F. Frankland,
[illegible] Secretary,
c/o B. Noble, London, Ont.

Dear Sir: Your letter received and sorry to say there will be no report from myself to the annual convention this year. I might say it is a one man's job to get the Sanitary and Heating Engineers in Ontario to pull together. So I have given it up for the present as I have neither the heart nor the time. Kindly see that they appoint a live vice-president for next year and let me out.

Hoping the Convention will be a big success, I remain

Yours truly,
A. J. Hammond.

Report of Canadian Institute Received

Secretary Frankland stated he had received a report from the Canadian Institute of Sanitary Engineers, whose headquarters are in Winnipeg. The Secretary explained that this Society is composed principally of plumbing inspectors in the territory from Fort William west. Their report stated they have been endeavoring to get a uniform plumbing code for the Dominion of Canada. On motion the report of their proceedings was received and will be referred to the London Society to act in conjunction with them along the lines suggested by President Russell.

W. J. CRAWFORD
St. John, N.B., Provincial Vice-president for New Brunswick.

Trade in New Brunswick Satisfactory

To the officers and members of the Canadian Society of Domestic Sanitary and Heating Engineers:

Gentlemen: Having had the honor of being elected national Vice-President of this association, and as is the custom, I hereby submit my report.

While I cannot say that I have done much to build up our association, yet I think some good has been accomplished between the manufacturer and jobber and our association, so far as our province is concerned.

The conditions of trade in this section have been very satisfactory, all shops being busy. The only drawback experienced was the scarcity of help. This was due in a great measure to the number joining the overseas forces in defence of the Empire.

I would be remiss in my duty were I not to refer to the good work that is being done by our association by our good friend the Editor of Sanitary Engineer. No craft or business has been benefited to a higher degree under the influence of a congenial, wideawake and researching technical journal than has ours. This is a feature which in the abstract has been recognized, but I believe we should go further and see that the seeds of knowledge, the trade press, should, by our association, be systematically circulated among the members of our craft, especially among the unaffiliated

Personally we seldom meet one another, but through this medium we may be kept in constant touch.

It becomes my sad duty to make mention of the death of L. H. Estano of Moncton. Mr. Estano was devoted to the association and its interests and was willing at all times to give unselfishly of his time and energy to the development of the work.

As to our Association work in the Province, the Provincial Vice-President, William Crawford, will cover it in his report. Owing to ill health I was unable to attend the Provincial meeting at St. John on the 12th inst., and for the same reason I regret that I will be unable to meet you in the city of London. This is a sore disappointment to me for I was looking forward with a pleasurable interest to meeting and renewing acquaintances which were formed at St. John Convention.

In conclusion allow me to say that while I am not personally present my thoughts will be with you, and I express the hope that the twenty-first annual Convention will be the most successful Convention ever held.

Very truly yours,
Dennis J. Shea,
National Vice-President.

OVERHEAD EXPENDITURE

One of the most important notes sounded at the recent banquet held in London by the Canadian Society of Domestic Sanitary and Heating Engineers, was that of the importance of overhead expenses J. R. McNicol of the Dominion Radiator Co., Toronto said that instead of the heating engineer robbing the public they were robbing themselves by not giving sufficient study to their overhead. No matter what kind of business a man be engaged in, there is always some expense attached to that business. "Such expenditure is very often overlooked by a large per cent. of our trade" said he. And that is the reason why so many fail in business.

The invoice is only one of the items which make up an account, Mr. McNicol expressed a sincere hope that overhead expenditure might be given more thought in future.

Alexandre Charette, Montreal, is New President

Enthusiastic Worker From Montreal Elected to Chief Executive Position—C. R. Myers, Stratford, is Vice-President and T. J. Conroy, Montreal, Secretary-Treasurer — Convention Goes to Montreal Next Year.

THE report of the Nominating Committee of the Canadian Society, composed of Thomas Maxwell and R. McG. Coyle, laid the following slate of officers before the Convention to fill the various offices during the year 1916-17. On motion of R. McG. Coyle of Chatham and John Cunningham of Paris the report was accepted by the Convention and the Secretary was instructed to cast one ballot for the election of the entire list. The new officers elected are: President, A. Charette, Montreal; Vice-President, C. R. Myers, Stratford, Ont.; Secretary-Treasurer, John Conroy, Montreal; Provincial Vice-Presidents: Quebec, Joseph Laurier, Montreal; Ontario, C. F. Frankland, Toronto; New Brunswick, W. C. Crawford, St. John; Nova Scotia, J. E. Godwin, Halifax; Prince Edward Island, D. R. H. Shaw, Charlottetown; Manitoba, James Mackie, Winnipeg; Saskatchewan, N. B. Roantree, Swift Current; Alberta, James Marr, Calgary; British Columbia, J. A. Anderson, Vancouver; Chairman of Committees: Sanitary, Angus McDonald, Stratford, Ont; Heating and Ventilating, R. J. McCauley, Montreal; Legislative, A. Archambaults; Essay, George Dorman, Moncton, N.B.; Apprenticeship, John Watson, Montreal; The committe further recommended that Montreal be the place of meeting for the next Convention in 1917. This was agreed to by the Convention.

President Russell thereupon called the three principal officers elect to the platform and invested them with the insignia of their office—red roses with sprays of four-leaf shamrocks, symbolic of great good luck. President Charette was called upon by the Convention for a speech in French. In a few well chosen words he thanked the delegates for the honor conferred upon him and said he hoped to merit the confidence they had placed in him. His speech was received with a hearty round of applause, attesting to the high esteem and popularity of the President-elect.

Toronto Hotly Assailed

John McKinley of Ottawa wanted to know if any progress had been made in Toronto toward the end of making it compulsory to use only iron pipe in buildings in Toronto.

A. CHARETTE
Montreal, Newly Elected President of Canadian Society.

T. Maxwell stated that the Council had been interviewed but that as yet nothing satisfactory or definite had been accomplished.

President Russell: "This condition of affairs in Toronto is a positive disgrace. It is placing one of the leading cities in the Dominion in a most farcical and non-progressive light. As a large, influential and rich city Toronto should take the lead in such matters without having to be jarred into her senses from outside sources. But measures should be taken in accord with progressive ideas of the time to prevent the use of tile piping in buildings. I would like to see that the fullest publicity be given to this matter in order that it might focus attention on the condition which exists in Toronto," concluded President Russell.

Edwin Newsome, editor of Sanitary Engineer, stated that one of the very necessary reforms in building in Toronto was the elimination of the intercepting trap. "I venture to say that a large per cent. of the breathers in house ventilation are plugged up", he added.

James R. Haslett, London, differed in his opinion about the advisability of eliminating the intercepting trap. "I thought" he said "it had long been conceded that climatic conditions should wholly govern the use of intercepting traps. I claim they are necessary because centilating pipes will become choked with hoar frost if they are not present." He thought the proper place for them was near the eaves, but they could not afford to put them there because it was not compulsory and the other fellow would not put them there until compelled to. It cost more to place them in that position.

John McKinley of Ottawa said that in his city not one job in a hundred is completed with the intercepting trap. He thought greater care was required in the installation where the ventilating pipe runs through the roof. He was of the opinion that the sewer was the much better form of ventilator. He thought the intercepting trap should be abolished.

The business of the Convention then being concluded adjournment was moved.

Those Present

John Cunningham, Paris; J. J. Robb, Stratford; R. H. Sehl, Waterloo; W. F. Rodgers, Stratford; J. E. Fullerton, Toronto; T. Maxwell, Toronto; Chas. Childs; Fred. H. Smith, James Robertson Co.; Geo. E. B. Grinyer, Guelph; J. E. Farrell, Pease Furnace Co.; J. Careron, United ; A. Charette, Montreal; L. J. Conroy, Montreal; R. McG. Coyle, Chatham; Fred Quinn, Warden-King; W. Taylor of Taylor-Forbes; C. Needham, London; T. Minnes, Brantford; W. Downs, Hoyt Metal Co.; John Eggett, London; J. Alcott, Gurney Foundry Co.; Alex. Mains, Empire Mfg. Co.; R. Owens, H. Aked, London; John Birchard, Warden-King Co.; T. Rich, London; E. Needham, Wolverine Brass; J. J. Cornelius, Canadian Wolverine; W. Jardine of Jardine Co.; R. W. Williams, Steel & Radiation; L. Robb, Empire Mfg. Co.; E. H. Russell, London, B. Noble, London; John McKinley, Ottawa; A. E. Gibbons, London; Dr. Stevenson, Mayor of London; Thos. Jones, Standard Ideal Co.

Officers Installed

The Thursday morning session was given up to the installation of officers, and the reading of reports which had just arrived from New Brunswick and Alberta. Secretary Frankland read the report of the Vice-President for New Brunswick, Alderman D. J. Shea of Fredericton. On motion of A. Charette,

Montreal, seconded by J. E. Fullerton the report was received.

The report of Vice-President Marr for the Province of Alberta was read and on motion of L. J. Conroy, Montreal, seconded by A. Charette, Montreal, the report as read was received and the matter therein referred to with respect to the standing of Alberta was left in the hands of the Secretary to attend to at once.

J. McKinley of Ottawa then took the occasion to thank the London Society for the very excellent way in which the delegates to the Convention had been treated and made welcome during their stay in the city. "We want to thank you for the very noble way in which you have royally entertained us. From the very day of our arrival here we have felt that we were among friends," said Mr. McKinley.

In seconding the sentiments of Mr. McKinley, J. E. Fullerton of Toronto said: "The whole work of the committee has been most untiring since our arrival here on Monday last. Arrangements which have been carried out under their direction could not have been better or more complete. I regret and deplore that a large delegation was not present from Toronto. I sincerely hope that we will be able to live long enough to repay in some measure the fine hospitality and untiring efforts of the London Society and all those who have had anything to do with the arrangement for the Convention.

President Russell then requested Sergeant-at-Arms John Eggett to conduct President-elect Charette with due solemnity around the room and presented him before the retiring President, E. H. Russell, for investiture with the office of President. In speaking President Russell said:

"It gives me great pleasure, Mr. Charette, to welcome you into your new office. I believe under your guidance the Society will how show great improvements during the coming year and that the membership will be increased greatly as a result of your efforts. From your past work in this Society I have every reason to believe that you will accomplish good in the interests of the craft."

President-elect Charette in replying said he felt the chair which he was to occupy was too big for him. "I can only try to follow in your footsteps Mr. President and hope that I may be able to meet with your expectations with some measure of success." Three hearty cheers were given for the new President.

C. R. Myers, the new Vice-President, and Lawrence J. Conroy as Secretary-Treasurer were in like manner invested with the responsibilities of their various offices. They made suitable and fitting replies to the few words of greeting of the retiring President.

J. R. Haslett then asked leave to express the sentiment of the trade as to the valuable assistance which is rendered from year to year by Edwin Newsome, editor of the Sanitary Engineer. Three cheers were given for Mr. Newsome. An expression of appreciation was also given for the Plumbers' Trade Journal through their representative, F. E. Wieber.

In closing the Convention President Charette asked all the delegates to be present in Montreal in 1917. "We cannot do as good as you have done here in the fine entertainment which you have afforded to all visitors to your city, but we would like to see you all at Montreal and we will do the best we can to make your visit there pleasant."

The Convention closed with the singing of Auld Lang Syne and God Save the King.

PRIZE WINNERS AT GAMES.

Baseball.

Manufacturers Team.

	—Innings—					
	1	2	3	4	5	6
Needham, c.	1	1	0	0	0	.
Harris, p.	1	1	0	0	0	.
Rose, 1b.	1	1	0	0	1	.
McLaren, 2b.	0	0	0	0	.	.
Childs, 3b.	0	0	0	0	1	.
Quinn, s.s.	1	0	0	0	0	.
West, l.f.	0	0	0	0	1	.
Downs, r.f.	0	0	0	0	1	.
Cornelius, c.f.	0	1	0	0	1	.
Total runs (13)	4	4	0	0	5	.

Sanitary Engineers.

	—Innings—					
	1	2	3	4	5	6
Sehl, c.	1	0	0	0	1	1
Noble, p.	1	0	0	0	1	1
Grinyer, 1b.	0	0	0	0	1	1
Conroy, 2b.	1	0	0	0	1	0
Cunningham, 3b.	0	0	0	0	0	1
Coyle, s.s.	0	0	0	0	0	1
Maxwell, l.f.	0	0	0	0	0	0
Haslett, r.f.	0	0	0	0	0	.
Fullerton, c.f.	0	.	0	0	1	0
Total runs (14)	3	0	0	0	6	5

Prize—Box of cigars.

100-yard race, Master Plumbers—G. E. B. Grinyer, first, pipe; R. A. Sehl, Waterloo, second, box cigars.

100-yard race, Manufacturers and Jobbers—W. E. West, Page-Hersey, first prize, umbrella; W. Downs, Hoyt Metal Co., Toronto, second, tobacco pouch.

50-yard three-legged race, open—Quinn and Downs, first, box cigars; Needham and Cornelius, second, box cigars.

Fat man's race—Bert McLaren, Galt Brass, first, fountain pen; Chas. Childs, second, cigar case.

50-yard race, men over 50 years—J. Saunders, London, first, safety razor; Ald. Ryding, Toronto, second, walking cane.

25-yard human wheelbarrow race — E. M. Harris and T. Mayne, first, box cigars; Quinn and Downs, second, box cigars.

50-yard boot and shoe race—W. S. Radforth, London, first, umbrella; E. M. Harris, second, pocket-knife.

Standing flat jump—A. D. McArthur, pen-knife.

High jump—W. W. Taylor, fountain pen.

Hop, step and jump—W. Downs, Hoyt Metal Co., umbrella.

Special race—R. A. Sehl, first, set of tools and dies, donated by Kardine Tool Co.; B. Noble, second; C. R. Myers, third.

Visit Empire Brass Plant

On Thursday afternoon the Society was the guest of the Empire Brass Manufacturing Company at the invitation of Chester F. Stevens, manager of the company. During the morning of the same day Mr. Stevens took the party for an automobile ride around the city where the fine residential sections of the city were seen, together with the well laid out districts comprising workingmen's homes. The course was through Springbank Park and into the neighborhood of the artesian well which supplies the city with drinking water which is famous for its fine quality.

In the afternoon the visit to the plant of the concern was most interesting with the large furnace rooms showing the brass in process of being melted, refined and poured into ingots. Since the war began this concern has already melted and sent out 11,000,000 pounds of metal. The metal stock rooms showed several tons of brass turnings arranged in great bins.

The core rooms showed the large and small cores and the core ovens which showed the method by which they are baked. The moulding shop showed all manner of plumbing goods in process of being made. In the machine shop all manner of automatic lathes were in operation, many of them self-feeding and fitted with compressed air operated chucks. The polishing and buffing plant was most interesting and impressed the visitors with the necessity of properly finishing these articles. In the nickel-plating, testing and inspection department there was much of interest. A Charette, president-elect of the Canadian Society was so greatly interested in the various processes that he found it hard to leave the plant. Being an old brass moulder himself, he found many things of unusual interest. He declared he was coming back to spend a day in the plant when he had more time.

NEW FITTING CATALOGUE

The Detroit Valve & Fittings Co., Detroit, Mich., have issued catalogue No. 3 to the trade. The price list on straight size fittings has been revised and a price list added on all reducing sizes. These lists are based on the estimated average weights of the fittings and so figured that price fittings take a uniform discount. This list includes malleable iron fittings for steam, gas and water, drainage fittings and specialties also malleable and grey iron castings. The price lists are very complete and the catalogues fully illustrated.

Lack of Sanitation Wiped Out Cities

Peter McArthur,—Poet, Journalist and Agriculturist—Tells Sanitary Engineers What Proper Exercise of Their Calling Might Mean — Speaks in Humorous Vein—Banquet a Big Success

"MOST of the great cities of ancient times have been destroyed because of the blows which they have received through pestilence or other diseases brought about through insanitary conditions. Rome, Athens, Tyre and many other cities have fallen from their proud places because of such scourges. I am told that ancient empires even have fallen through the lack of sanitary conditions. So modern ones may fall if the right precautions are not taken to safeguard against such an issue," said Peter McArthur, poet, journalist and agriculturist during the course of an address at the banquet tendered by the Entertainment Committee of the Canadian Society of Domestic Sanitary and Heating Engineers at the Hotel Tecumseh, London, Ont., during the twenty-first annual Convention of the Society which was held in that city, June 20 to 22.

Mr. McArthur was the invited guest on the occasion and spoke in a most entertaining manner when he was called upon for his address. In introducing him the toastmaster, James R. Haslett, paid a tribute to him as a "homegrown" product of Middlesex County in which the Convention city is located. By way of further introducing him as a literary man Mr. Haslett quoted the well-known poem of the speaker entitled "The Prodigal." Mr. McArthur introduced his subject in a humorous vein which greatly amused his hearers.

"When first requested to make an address to this body I could find no excuse why I should be so honored, except perhaps that in my travels through the world so far I have always paid my plumbers' bills promptly. However, it was something to have gone to school with Tom Rich and later with Sam Stevely (two well known members of the London Society, the latter having been Mayor of London and alderman of the city in recent years.)

"It seems to me that you rather should have gone to my friend Sam Wood, an editor and naturalist connected with the Toronto Globe. Sam was a plumber by trade. It has always been a mystery to me why Sam Wood should abandon the sure rewards of the plumbing trade for the uncertain ones of literature. As an instance of the shrewdness with which he conducted his plumbing business Sam actually charged double price for doing a corner job. When asked to explain why his charges should be so high for that particular kind of work he told me that it took one man's time to keep on the lookout both ways.

"On conjuring in my mind for a suitable subject I thought perhaps a suitable one might be 'The quality of sanitary arrangements of local railway stations, or of the country hotels.' It also occurred to me that the subject of steam heating might also be a fitting subject, for many nights have I lain awake listening to the steam heating system communing with itself. I have spent part of my life in apartments and the mystery of Shadrach, Meshach and Abednego coming through the fiery furnace has never appeared a mystery to me thereafter.

PETER McARTHUR

Who addressed the Canadian Society at their 21st Annual Convention Banquet, held in Tecumseh House, London.

"Many subjects have been discussed recently. One of the books which I have recently been reading was about the rise and fall of Empires. One in particular showed that empires came and went like hay crops. But it might possibly be shown that the rise and fall of empires depended on sanitary plumbing.

"Before coming to this gathering I was discussing with a friend the question of plumbers' bills. He suggested that plumbers could put a stop to the war if they were to undertake the manufacture of shells and that the Kaiser should be notified that the bills for the same would be sent to him.

"But joking aside, I want to ask you that you forget that you are members of a particular class in this country. More and we should realize that we are citizens of a great country. It is becoming increasingly necessary that we realize that we are all kings. There are all sorts of reconstruction ideas in the atmosphere now as the result of this war. I have a peculiar love for Canada. I regard her more as an ideal than a country. My father and mother came to this country as a land of opportunity and equality. They came so that their children could be free men and women and establish homes according to their own ideas. It isn't boundaries or history that makes a nation. It is the ideals with which that country reaches into the future that gives it a place. I have talked with many boys who have fought in this war and others who are preparing to go. In every instance I have found that they are not fighting to increase our boundaries. They are fighting in order that freedom and equality, justice and righteousness should not perish from the earth. I feel that we should consecrate ourselves to this new ideal. We are all equal. And you in your way and I in mine will be able to further that ideal."

List of Toasts

The program at the banquet was a lengthy one and provided for a most sumptuous repast, songs and readings and an extended toast list. The toasts presented and responded to during the evening were "His Most Gracious Majesty the King," "The Army and Navy," "The City of London," "The Canadian Society," "The Manufacturers and Supply Houses," "The Press," and "The Ladies." There were many speakers during the course of the evening among them being Alderman Sam Ryding, representing the Mayor and city of Toronto; Alderman J. J. Dyer, acting Mayor of the City of London; E. H. Russell, past president of the Canadian Society of Domestic Sanitary and Heating Engineers; John Fullerton, Toronto; Garnett F. Frankland, secretary of the Canadian Society; Fred Mitchell of the London Engine Supply

Company; Thomas Alcock; J. R. MacNicol; Chester Stevens, Empire Brass Manufacturing Company; Robert Hannah; J. Slater, Galt; ex-Alderman Saunders of London; Red Owens; A. E. Nutter, London; T. Rich, London; A. E. Gibbons, London; John Eggett, London; Edwin Newsome, editor Sanitary Engineers; H. Aked London; M. Schroeder, Galt.

Guests Present

Those present at the banquet included: J. H. Saunders, London; T. B. Alcock, Toronto; E. H. Russell, London; Alderman J. J. Dyer, acting Mayor of London; James R. Haslett, London; Peter McArthur, London; Alderman Sam Ryding, Toronto; Commissioner F. C. Mitchell, London; L. L. Mayne, London; Private E. Billings, Guelph; W. H. Meredith, Toronto; William C. Murray,

At the Banquet held in the Tecumseh House Peter McArthur suggested that all plumbers should notify the Kaiser that they intend to start making ammunition and render their bills to him for payment.

London; Charles E. Percy, London; Robert Hannah, London; W. W. Taylor, Hamilton; Lieut.-Col. James S. Taylor of the Headquarters Staff at London, who gave a most interesting talk in responding to the toast "The Army and Navy,"; V. J. Haslett, London; T. A. Stevens, London; R. Slater, Galt; F. E. Wieber, Plumbers' Trade Journal, New York; A. J. Blakie, deputy reeve of Westminster; John Eggett, London; H. Aked, London; H. N. Crain, Hamilton; Charles B. Child, London; A. L. McInnis, Woodstock; D. W. Rose, London; A. C. Nobbe, London; Fred H. Smith, London; George A. Davison, Woodstock; H. C. Filsinger, Toronto; A. Jardine, Hespeler, Ont.; Ben Noble, London; Ed. Holland and Percy King, London; C. J. Pink, London; J. J. Cornelius; Sergt. N. H. Hanley, 111th Batt.; E. S. Needham, Toronto; H. A. Plastow, London; J. R. MacNicol, Toronto; Stan Radforth, London; J. A. Dokie, Toronto; H. J. Widden, London; C. J. Needham, London; T. H. McLaren, Galt; Robert McDougall, Galt; C. F. Rodgers, Hamilton, E. B. Fewings, Galt; W. C. Fallon, Galt; M. A. Schroeder, Galt; H. M. McAlpine, London; Lieut. W. H. Robinson, London; O. L. Robb, London; C. F. Stevens, London; John Buchard, Toronto; Fred S. Quinn, Toronto; John E. Fullerton, Toronto; C. F. Frankland, Toronto; Alexandre Charette, Montreal; Thomas M. Maxwell, Toronto; R. W. Williams, Toronto; Thomas Rich, London; John Dunsmore, Toronto; "Red" Owens, Toronto; E. M. Harris, Toronto; Arthur E. Nutter, known as "Sir Roger Casement," London; A. E. Gibbons, London; H. Caton, London; George E. B. Grinyer, Guelph; John Cunningham, Paris; D. M. Speirs, Hamilton; R. A. Sehl, Waterloo; W. C. Downs, Toronto; John McKinley, Ottawa; C. R. Myers, Stratford; E. D. Billings, Guelph; C. T. Bull, St. Thomas.

A SOLDIER AND A MAN

It is very doubtful whether there is another man connected with the plumbing, heating and ventilating Business in Canada who has gained such popularity as has J. S. Taylor of the Taylor-Forbes Co., Mr. Taylor is one of five brothers. He started in life in a practical way with the J. Morrison Co., brass manufacturing, Toronto, and from that humble occupation gradually worked himself up by hard study to be one of the authorities on heating and ventilating engineering in Canada. Not only has Mr. Taylor proved himself to be an efficient engineer and thus become a valuable citizen of Canada but he has also served his country as a soldier. twenty-three years ago he joined the military ranks with the Royal Grenadiers and assisted the Mother Country in the South African War in 1900. Mr. Taylor was one of the veterans in that war and was wounded in the relief of Ladysmith, and up to a few weeks ago Mr. Taylor served on the Military Headquarter Staff in the rank of Major, and distinguished himself in such a creditable manner resulting in his being raised to the rank of Colonel.

No soldier is more highly respected than is Colonel J. S. Taylor of the 30th. Wellington Regiment. In that capacity he delivered a splendid address at the recent banquet held in London under the auspices of the Canadian Society of Domestic Sanitary Heating Engineers Annual Convention. In addressing the members present, Colonel Taylor expressed his appreciation in no small degree of the work being carried on by the Sanitary and Heating trade in Canada. He said: "That while many of the Canadian people held the trade up to ridicule, he felt sure that the time was not far distant when the public would begin to realize the importance of their work as well as the necessity of the craft and their work in the process of building up a great nation. The public seemed to hold the opinion that plumbers and steamfitters were little better than robbers, that their charges for work done were exorbitant and so on, but such an opinion had been formed more or less because of the lack of knowledge which the public had of the work done. No body of men had accomplished so much for the general welfare of humanity as had plumbers and steamfitters, and no craft had so small an amount of

Straw Hats were in evidence at the Tecumseh House. Brother Alcock, of the Gurney Foundry Co., Toronto. One fits him alright, the other might have done some time before he was born.

dollars and cents to their credit which to a great extent proved how poorly such work had been financially recompensed.

Speaking of recruiting and men who served in a military way he felt that no man should be bullied into enlisting. If a man could conscientiously say that his duty is at home and if that man was really doing his bit in an industrial capacity, he was just as necessary in his civilian capacity as was the soldier. This war could not be won solely by the militia, but rather by men in all ranks of life doing their level best for their country with an unselfish motive, and he was doubly proud that he was a member of the craft and a soldier, and while the war lasted he felt his duty to lie in doing his best in his capacity as a soldier.

A Splendid Opportunity in France

Chances for Canadian Manufacturers and Merchants Will Develop After the War.

THE following letter has been received from C. A. Chouillou, of C. A. Chouillou & Cie, of Paris, France. M. Chouillou was in Montreal some years ago and so has an intimate knowledge of trade conditions in Canada, so that his criticisms and suggestions should have double weight.

Considering that over 20 millions of inhabitants only in France and Belgium have had their cities, properties, buildings and homes destroyed systematically by the enemies, it will be necessary to proceed to the reconstruction and the reorganization of the towns, factories, homes.

It is evident there will be for the up-to-date merchant and manufacturer an exceptional opportunity to find new markets for their goods and wares.

In view of securing not only present but future business the Canadians will have to modify their ways of doing business and to comply a little more than they have so far to the tastes and customs of their new buyers.

At present, Canadians are taking advantage of the situation selling their goods at high prices F.O.B. shipping points and asking payment cash by irrevocable banker's credit against bills of lading when they do not ask payment in advance of shipment.

This may be well and good as long as the war will last, but it will not last forever; and it might be wise to consider the question of business after the war, which is in our mind the most interesting to cater for.

What will be the goods most wanted after the war for the reconstruction of the devastated countries, and which may lead to a considerable amount of business?

In the first place, portable houses of all descriptions for the reconstruction of homes, schools, churches, farm buildings, barns, chicken houses, etc.

Roofing material of all description, metal, paper, asbestos, railway material and supplies, ties, rolling stock, locomotives; office furniture, house furniture, especially dining and bed room heating and kitchen stoves, kitchen utensils; hardware and anything metal will be required; labor-saving machinery and hand tools of all descriptions for carpenters, metal workers; road machinery; agricultural implements, tractors; All kinds of machinery for the cotton and woollen industries; canned meats, vegetables, lobsters, salmon, etc.

The Canadian exporter must be willing to sacrifice something and make a certain effort to get his share of that new business.

He must, for instance, sample his goods freely, send travellers speaking the language of the country or appoint local agents to show and advertise same.

Many Canadian firms are willing to confer their agencies, but nine times out of ten they want the agent to buy the samples necessary to do business.

Naturally, very few agents accept, as they do not want to crowd their rooms with samples, which may be eventually of no value or upon which they would lose heavily; thus, eating part of their commissions, which are the only remuneration for their work.

Canadians, who are as a rule flush with their selling staff at home, are on the contrary mean and stingy with their representatives abroad. This would lead to the impression that they do not care much for export business unless they can secure it without any trouble or sacrifice or in view to relieve the home market of a surplus production.

A great number of firms—and this is due to the ignorance or neglect of their mail department—post their letters with a 2- instead of a 5-cent postage stamp, causing to the receiver an expense for insufficient postage.

Through lack of knowledge of foreign languages Canadians have in the past used German agents almost entirely in Europe, and those agents, according to their custom, have been taking advantage of this state of affairs to favor competing German industries to the detriment of Canadian trade.

If it is wanted to do business with France, let it be understood that it must be through our own men or through French travellers or representatives well conversant with French and Canadian methods and customs.

Canadian firms are also inclined on account of the language to give the control of the sale of their goods for Europe to an English firm.

It is in our mind a mistake to have a "sole" European representative to take care of your business interests all over Europe. Languages, economical conditions and customs are so different between countries in Europe that it is impossible for an English agent for instance to look after your interests in Spain or Greece, as it would be for a French representative to take care of your business in Holland or Sweden.

If you care to do business in the different countries of Europe have a "sole" representative in each of them and keep in direct touch with him.

The information you will get concerning the requirements and needs will be far more accurate and reliable than if they come through a third party unfamiliar with the trade of that country and customers.

Those remarks can equally be applied to European firms which give their sole agencies to American firms in New York, ignoring, it seems, absolutely, the importance of Canada, and therefore the necessity of an independent and direct Canadian agency.

The commercial and political interests are so different in the two countries, although close neighbors, that an American agent cannot work satisfactorily our Canadian market.

It is to be hoped that Canadian firms will change their ways and deal in the future direct with France for the greater benefit of all concerned.

BRANTFORD WANTS LICENSE FEE INCREASED

It is the desire of the plumbers of the city of Brantford to increase the fees charged for licensing, plumbers and electricians, and include steam, hot water, sprinkler fittings and all classes of pipe installation, and to prohibit men outside of the city from taking out licenses for such work unless they comply with the transient traders' bylaw, which carries with it a fine of $100., City Clerk Leornard has written to the city clerks of several municipalities requesting information concerning similar by-laws in their respective cities. The latter part of this item referring to transient traders is a matter of great interest, to sanitary and heating engineers. It is felt by many throughout Canada that some such by-law should exist in every town because it often happens that an outsider scoops in the best and biggest work.

JUST PASSED ON

Words cannot express the sorrow we feel at having to inform our readers of the passing away, on Tuesday, June 20th, of Martha, the beloved wife of L. L. Anthes, of The Anthes Foundry Co., Toronto.

Last Empire day Mrs. Anthes presented her husband with a fine daughter, and for days all seemed to go well with her but sad to say complications set in which cost the mother's life, the baby [illegible]

When the news reached London at which city the Annual Convention was being held, all who knew "Laurie" felt [illegible] own kith and kin.

The late Mrs. Anthes was in her 27th year, the daughter of the late Edward McLean who had charge of the Pennsylvania Railroad Foundries.

She leaves a sorrowing husband and babe, two brothers and two sisters.

The Sanitary Engineer joins its readers in extending to friend Anthes [illegible] sympathy at this sad [illegible], and trusts that the sweet little daughter may grow up to be a source of great comfort to him in days to come.—Editor.

CONVENTION TOPICS

Though few in numbers the recent conventions, both Ontario and Canadian. There was a snap to every move which reflects great credit upon those taking part in the proceedings.

Straight to the point and no long drawn out vain repetitions was the order of the day. Ben Noble can't see how an association can be run on the credit system. His outstanding feature is "Pay up."

STANDARDIZATION

One of the important topics discussed at the recent Annual Conventions held in London, was that of "Standardization" of materials. It was referred to during the business meetings as well as at the banquet. C. F. Stevens of the Empire Manufacturing Co., London, laid great stress upon the need for standardization, pointing out that the great variety of standards adopted in the different cities and provinces resulted in the making of thousands of dollars worth of extra patterns, sizes and gauges of tube, etc., as goods for one city would not meet the requirements of another city. It would be hard to imagine any change more desirable than to have a standard adopted which would meet the requirements of the trade throughout the Dominion. We would strongly urge every member of the craft to do his part in trying to bring this standardization question to a successful issue.

BELIEVE IN MAIN HOUSE TRAP AND BREATHER

He is little, but big, big in heart, big in brain and big in accomplishments. We are referring to J. R. Haslett, London, not a mean streak in him, calls a spade a spade right off the bat, and believes what he says. Anybody wanting to start something should let Jack Haslett hear them say, "I don't believe in the main house trap" and Jack's right there. That's the kind of men we want in the sanitary engineering business. those at least who do things and have a good idea why they do them.

Mr. Haslett knows how when and where a trap should be vented and carries out his ideas in practice.

How many men have we in the trade who do things simply because "the by-law says so?"

Although he is a firm believer in the main house trap and breather. He is not so set in his views that if he can be shown where an improvement can be made that he would not adopt the new view of things. The worst we can say of Haslett is that he is a thinker and a willing worker.

PUBLIC COMFORT STATIONS

The past president of the Canadian Society of Domestic Sanitary and Heating Engineers (E. H. Russell, London) gave a splendid address on question of Public Comfort Stations. He deserves great credit for way he handled the subject. With closing of a large number of hotels in Ontario and other provinces, the travelling public, who in many towns have had no other recourse but the lavatory accomodation provided by these hotels, will be put to a great deal of inconvenience by the lack of such accommodation.

This question is not only one of personal convenience, but is of vital importance to one's health. The health of a community is its greatest asset, and it is an indisputable fact that persons walking up and down our streets require more comfort station service than is furnished in any of our Canadian cities. No doubt the Canadian Society will be able to report great advances in this direction before another year has passed.

NEW HAND BOOK

The Penberthy Injector Co., Windsor, Ont., have issued an engineer's ready reference book for the boiler and engine room. The book contains 21 pages and deals with the "Penberthy" line of injectors, lubricators, "Compodisk"

ARE YOU BUYING FOR PRICE?

IF YOU ARE, YOU CANNOT COMMAND QUALITY

No line of brass goods require to be as dependable as those which go into the bathroom. Many a low-priced bath-cock has cost from $50.00 to $100.00 in damages and water waste.

We have to maintain our price to insure quality. Every dollar we have is behind the goods we sell.

MUELLER

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RAPIDAC

QUALITY FIRST IS OUR CHIEF AIM

One of our Customers said:

"MY father and I have been in the plumbing business over 25 years and our biggest losses have been caused by trouble with inferior brass goods.

"We are building up a splendid business on quality brass goods. Every dollar we spend with Mueller's is like putting money into the bank with compound interest.

"WE NEVER HAVE TO GO BACK TO REPAIR MUELLER RAPIDACS."

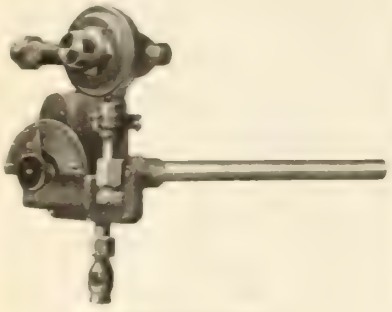
"The Quick-Acting Compression"

H. Mueller Manufacturing Co., Limited

SARNIA, ONTARIO

POWERS MONEY SAVERS

No. 10 Tank Regulator



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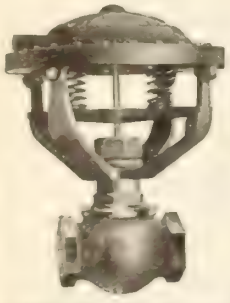
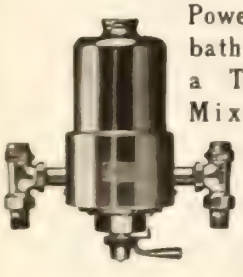


DIAPHRAGM VALVE

Applied to Domestic Water Heaters.

Prevents Over-heating and Saves Steam.

Satisfaction Guaranteed



Powers Shower-bath Controller a Thermostatic Mixing Valve which insures a constant temperature.

Easily adjusted to any desired temperature.

Positively Anti-Scalding.

The Canadian Powers Regulator Co., Ltd.

159 Richmond West, TORONTO

valves, oilers, etv. Each type of apparatus is illustrated and described together with a price list and particulars of each size.

Messrs. Bowman and Bennett have taken over the sanitary and heating engineering business as well as the hardware business formerly owned by Messrs. Bernhardt and Spalding, Preston.

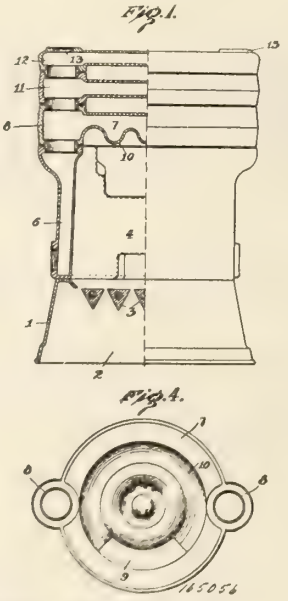
Mr. Bowman was for five years engaged with Bernhardt and Spalding and Mr. Bennett was for eight years with the firm of Scott and Bennett of Galt, Ontario. Both these men have received a splendid training and The Sanitary Engineer begs to join their friends in wishing that success may crown their efforts in further building up the present splendid business.

New Patents

No. 165.056.

William R. Stockwell, Irvington, New York, U.S.A., 21st September, 1915; 6 years. Filed 29th January, 1914. Receipt No. 234,038.

Claim.—1. The combination with a combustion chamber, of a combustion chamber top, a dome section and one or more intermediate sections, the combustion chamber top, the dome section and



No. 165,056. Boiler.

the intermediate sections being provided with flue openings, and the combustion chamber top being reversible, so that the fire opening of the dome section is always located in the rear irrespective of the number of sections placed between said combustion chamber top and said dome section.

PURO

SANITARY

Drinking Fountains

WILL PROVE A PROFITABLE LINE TO HANDLE

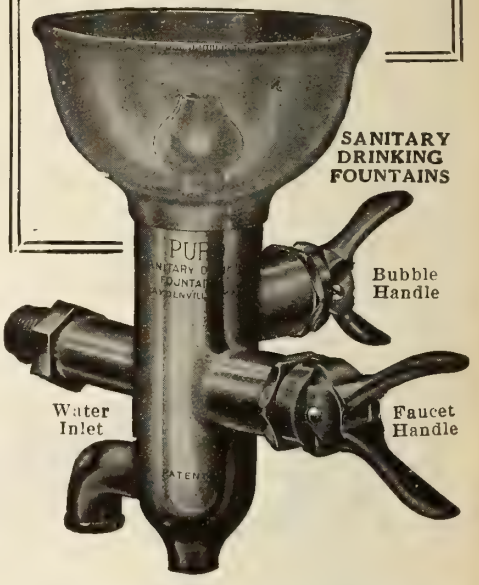
BECAUSE

The "Safety First" movement, which is becoming more popular every day, is particularly forcible where the conservation of the Public Health through pure drinking water is concerned. The old-fashioned, disease-laden public drinking cup will soon be but a memory in thousands of plants, offices, shops, public parks, schools, etc.

Herein lies the opportunity of the live Sanitary Engineer to materially add to his business by getting after those institutions and supplying them with the "Puro," the most economical and sanitary drinking fountain on the market.

The Puro Sanitary Drinking Fountain will recommend itself because of its simplicity of attachment, and its automatic control.

Write to-day and let us show you how to make a handsome profit, not only on the sale, but also on the installation of the "Puro."



Puro Sanitary Drinking Fountain Company

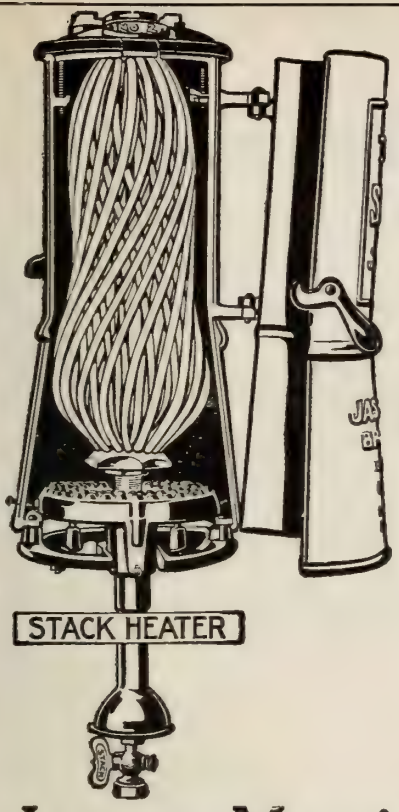
147 University Ave., Toronto, Canada

Condensed Advertisements

FOR SALE

TWO HORSE-POWER ELECTRIC MOTOR and Loew Pipe Cutter and Theader for sale at bargain price. Apply Box 840, Preston, Ont.

KINDLY MENTION THIS PAPER WHEN WRITING ADVERTISERS



STACK FACTS

From Recent Tests Made by Various Gas Light Companies

The STACK will heat 5 gallons of water 3 minutes quicker than the average heater.

The STACK raises the temperature of 5 gallons of water 28 degrees higher in 10 minutes than the average heater.

The STACK will heat 3 gallons more in 10 minutes than the average heater.

The STACK shows 15% greater efficiency than the average heater.

James Morrison Brass Mfg. Co., Limited

93-97 Adelaide Street West, TORONTO

Our Mixed Metal Sales Amount to Over $5,000,000 Annually

We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

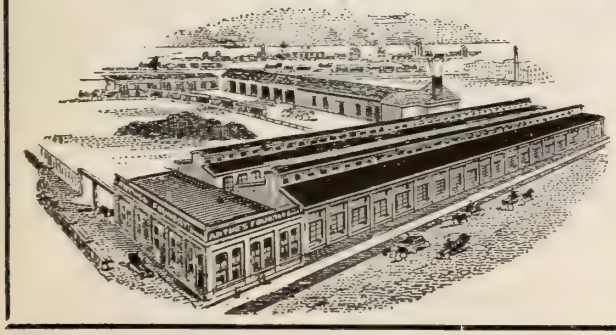
Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO

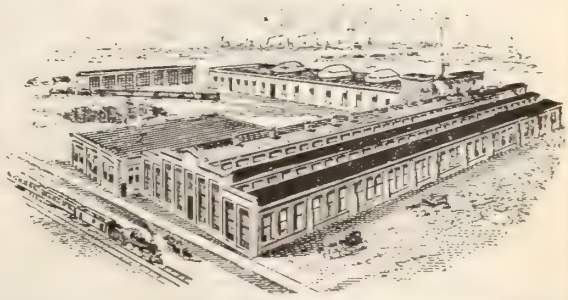
New York, N. Y.; London, Eng.; St. Louis, Mo.

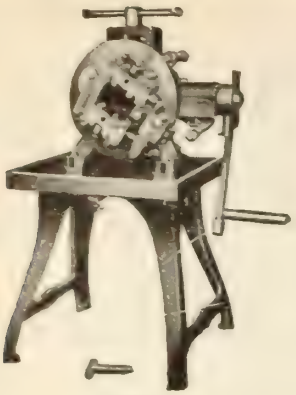
TORONTO **ANTHES FOUNDRY LIMITED** WINNIPEG



MANUFACTURERS OF

CAST IRON SOIL PIPE AND FITTINGS





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PIPE MACHINES

Either Hand or Power

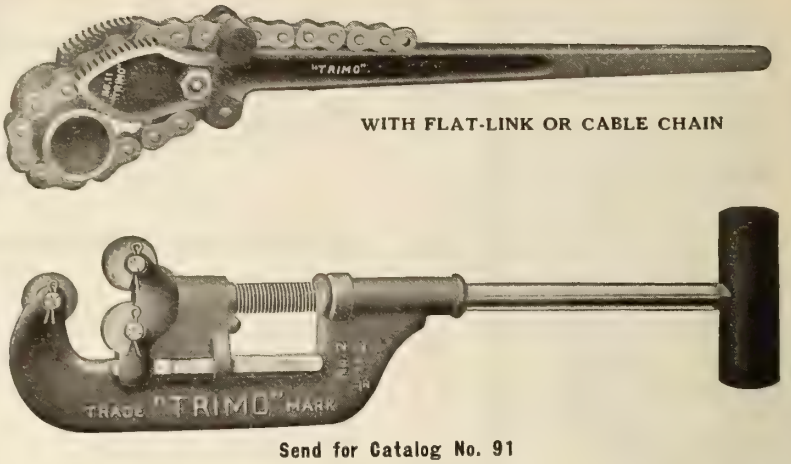
This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
A time and labor saving machine.

Manufactured by

THE ARMSTRONG MFG. CO.
317 Knowlton Street
BRIDGEPORT, CONN.
WRITE FOR CATALOGUE

World-Famed Specimens of the Age of Steel

TRIMO TOOLS



WITH FLAT-LINK OR CABLE CHAIN

Send for Catalog No. 91

MADE BY

TRIMONT MFG. CO., 55 Amory Street, Roxbury, Mass., U.S.A.

Consulting Sanitary Engineer

Advice and Plans on Water Supply and Sewage Disposal for Residences, Factories, etc.

H. L. SEYMOUR, B.A.Sc., A.M. Can. Soc. C.E. Box 95 Sanitary Engineer TORONTO - ONTARIO

R. O. Wynne-Roberts

Consulting Sanitary Engineer

310 TEMPLE BUILDING, BAY STREET TORONTO

Water Supply, Sewerage, Sewage Disposal of Cities, Villages and Institutions.

The Honeywell Air-Seal Generator

Generates and maintains a predetermined pressure without the use of springs, valves, weights or mechanical parts.

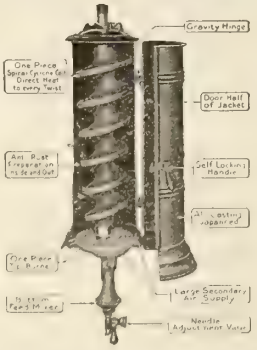
Made entirely of cast iron and will last indefinitely.

Easy to connect and requires no attention after installing.

Write for complete catalog —it describes in detail the construction and operation of this simple and inexpensive pressure-creating device.

The Honeywell Heating Specialties Co.
Wabash, Indiana

The Hotstream HEATS WITHOUT FUEL TRADE MARK REG. WATER HEATER

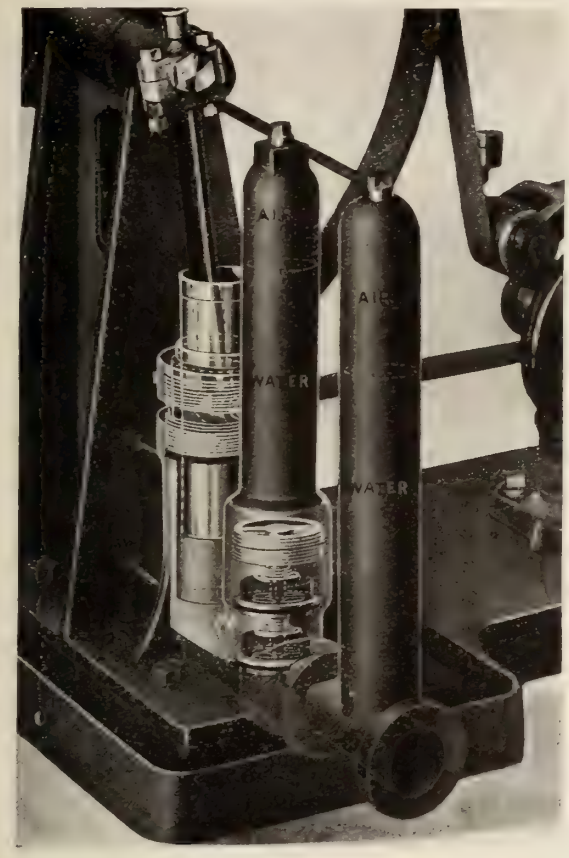

Gravity Hinge
One Piece Spiral Cyclone Coil Direct Heat to every Twist
Door Half of Jacket
Self Locking Handle
Large Secondary Air Supply
Needle Adjustment Valve

HERE'S THE NEW CYCLONE COIL

A *tapered* True Spiral.
More efficient and different in principle than *any* other.
Employing Nature's principles of centrifugal and centripetal force.
Direct heat impinges on every twist of the Spiral.
Can't choke the gas—it follows the coil *naturally.*
An *even* distribution of heat all around.
With *more* heating surface than has ever before been put into a cast coil.
Yet the Hotstream coil is of standard size.
There is an *unobstructed* free natural water flow.
With *no angles* or flat spots to form sediment pockets.
Longest possible life in bad water districts.
Each coil is *double tested* at a severe air pressure under water.
And we treat each one with a secret *anti*-rust preparation
There is absolutely *NO DANGER* of rusty or discolored water.
You will find Hotstream construction *perfect* in every detail.

GUARANTEED BY

THE HOTSTREAM HEATER CO. - CLEVELAND



WE PROTECT THE TRADE

Aylmer

THE STANDARD OF CANADA—
LET US SHOW YOU, MR. DEALER

1500 Electric House Pumps

PUMP MORE WATER ON LESS CURRENT
THERE'S A REASON

The Most Perfect Water Supply Systems Manufactured in Canada.

The Aylmer Pump & Scale Co., Ltd.
AYLMER, ONTARIO

THE SAFFORD MAGAZINE SELF-FEED

DOWN DRAFT BOILERS

Manufactured under Surrell patents, made in three series, 26"—31"—47". Above illustrates 26" series.

The SAFFORD MAGAZINE SELF-FEED DOWN DRAFT BOILER is the greatest achievement in the cast iron Boiler Field. This boiler fulfills every scientific requirement.

It burns cheap fuel smokelessly and maintains a steady pressure on one fire without attention for 12 hours and reduces the cost of heating 40% to 50%.

Manufactured by

The Dominion Radiator Co., Limited

Toronto **Montreal** **Winnipeg**

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[illegible] Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Air Valves.
Canadian Wolverine Co., Ltd., Chatham.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
Jenkins Bros., Ltd., Montreal.
Kerr Engine Co., Ltd., Walkerville.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Asbestos Goods.
James Morrison Brass Mfg. Co., Toronto.

Boilers, Steam or Hot Water.
[illegible] & Burnham Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Boiler Feed Regulators.
[illegible] Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Brass Goods, Valves, etc.
Canadian Wolverine Co., Ltd., Chatham.
[illegible] Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Jenkins Bros., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Brass Pipe and Tube.
[illegible] Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Bubblers.
Canada Metal Co., Ltd., Toronto.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.

Cellar Drainers.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Chain Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Closets.
Amherst Foundry Co., Amherst, N.S.
B. O. T. Manufacturing Co., Toronto.
[illegible] Ltd., Toronto.
[illegible] Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Consulting Engineers.
H. L. Seymour.
[illegible] Toronto.

Country Residence Equipments.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
[illegible] & Mfg. Co., Fort Wayne, Ind.
[illegible] Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Limited, Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Damper Regulators.
[illegible] & Burnham Co., Toronto.
[illegible] Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Drainage Fittings.
[illegible] Ltd., Toronto.
[illegible] & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.
[illegible] Foundry Co., West Toronto.

Drinking Fountains.
[illegible] Co., Ltd., Toronto.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.

Ejectors, Steam.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville.

Ejectors for Sewage.
[illegible] Ltd., Montreal.
National Equipment Co., Ltd., Toronto.

Enamelware.
Amherst Foundry Co., Amherst, N.S.
[illegible] Ltd., Toronto.
[illegible] Church St., Toronto.
[illegible] Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.

H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.
Standard Ideal Mfg. Co., Ltd., Port Hope.

Electric Pumping Machinery.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Faucets.
Canada Metal Co., Ltd., Toronto.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.

Fittings.
Canada Metal Co., Ltd., Toronto.
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H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Flushometers.
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Canadian Wolverine Co., Ltd., Chatham.
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H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
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Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

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James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

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W. E. Clark & Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.

Heaters.
Darling Bros., Ltd., Montreal.
Lord & Burnham Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Lead.
Canada Metal Co., Ltd., Toronto.
Hoyt Metal Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Mixing Valves.
Canada Metal Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Co., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Monkey Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Oil Storage Systems.
National Equipment Co., Ltd., Toronto.

Packing.
Canadian Wolverine Co., Ltd., Chatham.

Packless Radiator Valves
W. E. Clark & Co., Toronto.
Kerr Engine Works, Walkerville.

Pipe and Radiator Hangers.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.

Pipe, Black and Galvanized.
Canadian Tube & Iron Co., Ltd., Montreal.
Lord & Burnham Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Warden King, Ltd., Montreal.

Pipe Cutters.
Trimont Mfg. Co., Roxbury, Mass.

Pipe Joint Compounds.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

Pipe, Soil, and Fititngs.
Anthes Foundry Co., Toronto and Winnipeg.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Warden King, Ltd., Montreal.

Pipe Threading Tools and Machinery.
Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.
A. B. Jardine & Co., Hespeler.

Pipe Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Porcelain Ware.
Canada Metal Co., Ltd., Toronto.
Amherst Foundry Co., Amherst, N.S.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Pumps.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Radiators.
Lord & Burnham Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.

Radiator Traps (Steam).
Canada Metal Co., Ltd., Toronto.
W. E. Clark & Co., Ltd., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Reducing Pressure Valves.
Canada Metal Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Septic Tank Valves and Syphons.
Anthes Foundry Co., Ltd., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
West Toronto Foundry Co., West Toronto.

Solder.
Canada Metal Co., Ltd., Toronto.
Hoyt Metal Co., Toronto.

Steam Specialties.
W. E. Clark & Co., Ltd., Toronto.
Darling Bros., Ltd., Montreal.
Dart Union Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville, Ont.

Steam Traps.
Canadian Morehead Co., Ltd., Woodstock.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Smoke Test Machines.
James Morrison Brass Mfg. Co., Toronto.

Tanks, Steel and Wood
Ontario Wind Engine & Pump Co., Toronto.

Temperature Boosters
W. E. Clark & Co., Toronto.

Testing Plugs.
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Armstrong Mfg. Co., Bridgeport, Conn.
Canadian Wolverine Co., Ltd., Chatham.
Hall & Sons, Ltd., Brantford.
James Morrison Brass Mfg. Co., Toronto.
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Nicholson File Co., Port Hope, Ont.
Williams, J. H., & Co., Brooklyn, N.Y.

Unions.
Canada Metal Co., Ltd., Toronto.
Dart Union Co., Ltd., Toronto.

Vapor Heating Systems.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
W. E. Clark & Co., Ltd., Toronto.

Vitro Tanks
Cluff Mfg. Co., Toronto.

Vacuum Systems of Heating.
W. E. Clark & Co., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Water Supply Systems.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Darling Bros., Ltd., Montreal.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Make this Your Leading Boiler—It Will Make You the Leading Dealer

Satisfaction is the most profitable thing you sell your customers. The satisfaction that goes with the King Boiler does not confine itself to that, but brings trade in other lines. The goods that will back up your guarantee are—the King Boiler and King Radiators. Write us regarding our plan of dealer co-operation.

STEEL AND RADIATION, LIMITED

Mfrs. Steam and Hot Water Boilers and Radiators, and of Solid Steel Window Sash, Steel Reinforcing and Metal Lath.

Head Office, Fraser Avenue, TORONTO

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Do You Install Water Systems?

Being a plumber no doubt you do and we venture to say that that particular branch of your business, if properly developed, will be the most profitable. To be successful you must do your work well and must also install material that is as nearly perfect as possible, otherwise your reputation would soon be very bad, and no matter how hard you worked or how much you advertised you would soon find yourself without any business.

Keep Your Standard of Work High

TYPE "S" Pump showing Air Injector and Suction and Discharge Air Chambers.

TORONTO

DOMESTIC WATER SYSTEMS

Are the latest and most up-to-date as well as being the most efficient water systems on the Canadian market. A Toronto Water System properly installed will be an advertisement that will do your business more good than all the advertising you can do in any paper.

Write us to-day for full information of these excellent Systems.

Ontario Wind Engine & Pump Co. LIMITED

Toronto, Ontario

WROUGHT PIPE

BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.

All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED

Montreal Works: Lachine, Can.

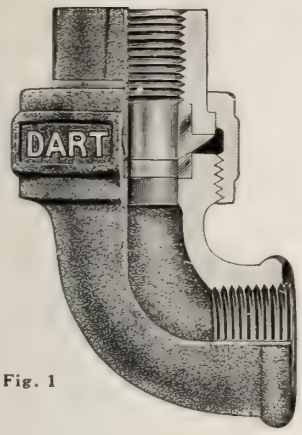


Fig. 1

2–BRONZE SEATS–2

No Deterioration

These Dart Union Elbows

(Female, and Male and Female)

Are Surprisingly Big Time and Labor Savers

When you connect pipes with

DART UNIONS

you are sure of the lasting qualities of the joint because the **Dart Union joint never rusts or corrodes** and the heavy iron parts cannot stretch or pull apart.

With Dart Unions you can make connections easily and quickly whether pipes are in or out of alignment.

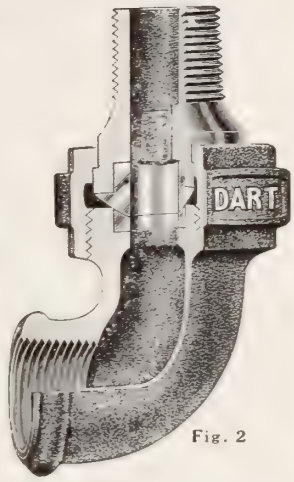


Fig. 2

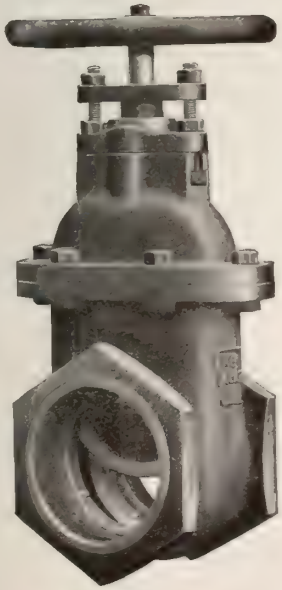
A 4-in-1 fitting.
Cuts out nipple and one thread at running end and nipple, elbow and two threads at the elbow end.

By the use of Fig. 1 you save two threads and do neater work.

Sold by all First-class Supply Houses.

Manufactured and Guaranteed by
DART UNION COMPANY, Limited
TORONTO, CANADA

KERR GATE VALVES

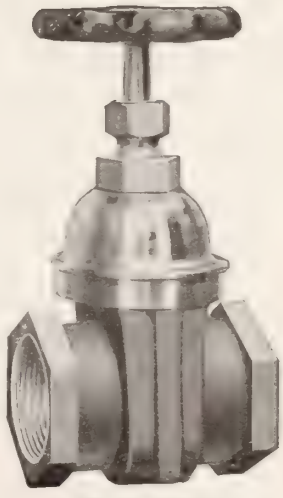

I. B. GATE

These Iron Body Gate Valves were designed and are made by US to meet YOUR demand for strong, substantial, interchangeable valves, with "nobby" appearance.

They meet the requirement and more. When they get us a customer they hold him.

Who in the Steamfitting trade has not heard of and used Kerr's (Weber) Brass Gate Valves? We say "Kerr's"—not the imitations. We make this valve of uniform material, and they stand up to the work given them, just as they always have. Some have tried others, but they came back to the tried and trusty old "Weber Gate" made by Kerr. What is a few cents on a valve, when you can get one like the genuine "Weber"?

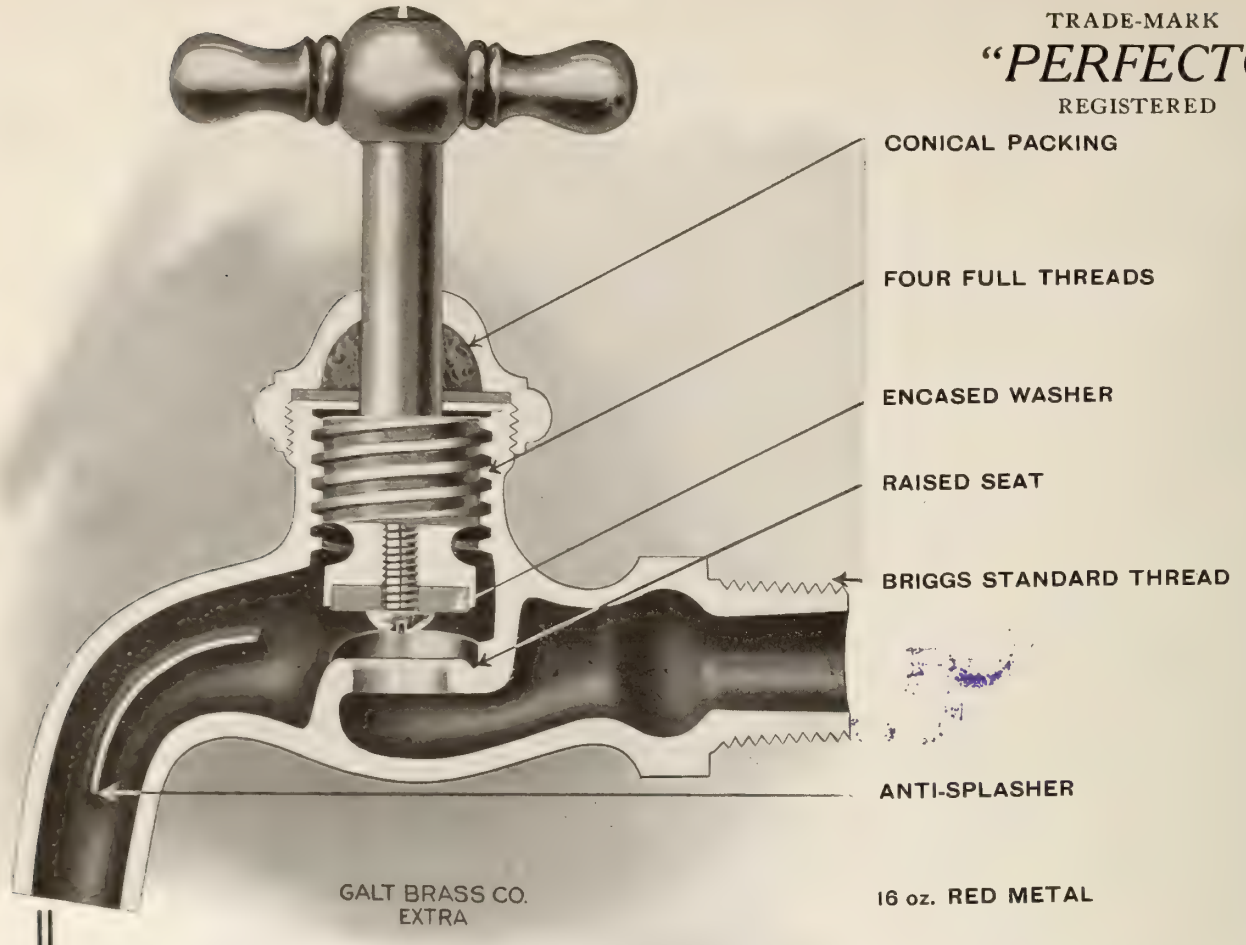
Have you our Catalogue No. 5?
If not, we will mail you one.
A postal to-day will bring it.


BRASS GATE

THE KERR ENGINE COMPANY, LIMITED

WALKERVILLE, ONTARIO

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

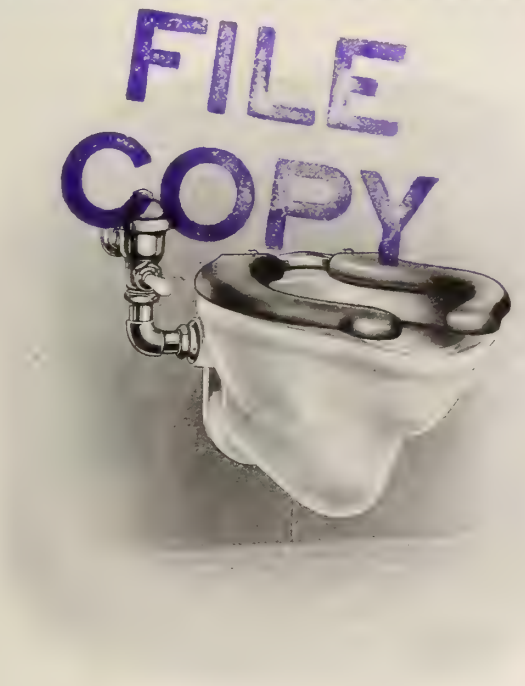
The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. X | Publication Office: TORONTO, JULY 15, 1916 | No. 14



The Flush Valve Closet

with vitrous china side inlet wall closet bowl, shown here is specially adapted for Schools, Hospitals, and all other Public Buildings. They are sanitary, durable and noiseless in operation. We supply this valve in many different styles to suit all requirements.

Our Frost Proof Closets

are giving excellent satisfaction. These closets won't freeze, and require no pit. Complete as shown, except cast iron soil pipe and trap.

The more the Sanitary Engineer knows about closets, the better he likes the "Empire" outfit.

Write us for circular describing our reliable Gasoline Engines. You can no doubt create a nice trade along this line if you go after it. Sold with a five-year guarantee.

Catalogue A sent on request.

Empire Mfg. Company, Limited

LONDON TORONTO

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Ask your jobber for BEAVER BRAND CAST IRON ENAMEL WARE
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Amherst Foundry Co., Limited

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CANADIAN CONSOLIDATED RUBBER CO. LIMITED
DOMINION
RUBBER SYSTEM
AND ASSOCIATED COMPANIES

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In that respect you run no risk when your choice is from the

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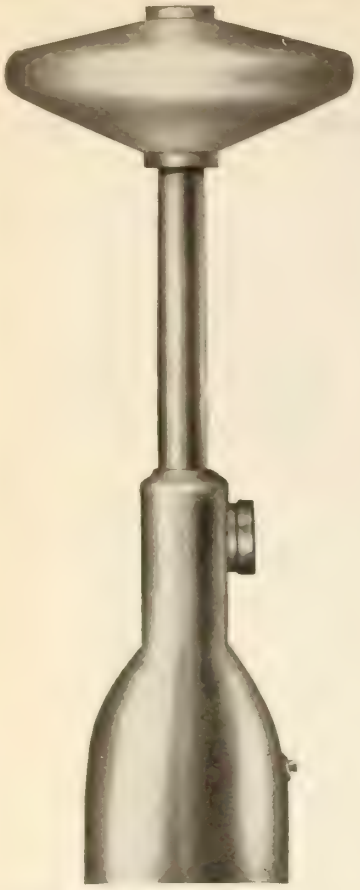


The Honeywell Heat Generator

IS BACK ON THE MARKET

We are very glad to announce to the thousands of users of our mercury Heat Generators that the mercury market has, for the past few weeks, been rapidly getting back to a normal condition.

We are now able to resume manufacturing.

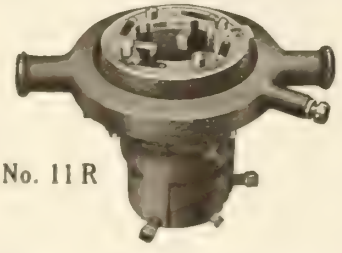
Orders for all sizes of the Honeywell Heat Generator can now be placed with your Jobber or Boiler Manufacturer and they will be promptly supplied.

The old discounts have been restored.

The Honeywell Heating Specialty Co.

WABASH, INDIANA

NOTE—Special Generators for Tank-in-Basement work have been permanently discontinued as our regular generators can be used successfully for this work. We will give you full information on request.



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"Jardine" Adjustable Ratchet-Threading Tool

Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely [illegible] excluding chips and dirt.

YOU CAN REDUCE THE LABOR OF PIPE THREADING 50 PER CENT., AND MAKE THREADS AS CLEAN AND PERFECT AS IF CUT ON A LATHE WITH ONLY ONE CUT WITH

"Jardine" and "Toledo" Pipe-Threading Tools

"Jardine" or "Toledo" dies spare the muscle of the man who does the work, and save money for the man who pays the wages, as they enable one man to do the work of two and costs less for repairs. No cams or jimcracks to wear and get out of order. Cutters that cut, don't squeeze. Set of cutters for each size of pipe. Lead screw ensures perfect pitch and form of threads. Adjustable to all variations of fittings, very durable cutters.

All threads finished at one cut. One man does the work of two.

It will pay you to look well into the merits of the "Jardine" and "Toledo" before placing your next order for tools of this kind.

Write for catalog and full particulars.

We'll gladly supply the names if you wish to have a chat with users in your town.

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HESPELER, ONT.

Sole makers of "Jardine" Pipe-Threading Tools.
Sole licensees to manufacture and sell Toledo Pipe-Threading Tools in Canada.
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Made in Canada.

Our other lines:

DAISY Hot Water Boilers.
VIKING Sectional Steam and Hot Water Boilers.
VIKING Steam and Hot Water Radiators.
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We manufacture and carry in stock a complete line of flanged fittings, both standard and extra heavy.

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200 Adelaide St. West, Toronto

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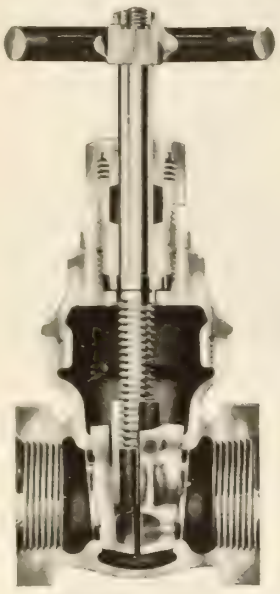
JENKINS BROS.' Type "K" GATE VALVES



SECTIONAL VIEW
FIG. 300

¶ Present a full straightway opening, and possess many points of merit that make them surpass the average gate. This superiority is due, among other things, to distinction in design with "service" built in, accuracy of workmanship; interchangeable construction; use of metal of highest quality; and a high safety factor.

¶ Maximum transmission capacity with longest possible service is always assured in JENKINS BROS.' TYPE "K" GATE VALVES.

¶ Made in every pipe size in brass and iron body, screwed or flanged with either stationary or rising spindle.

Consult us on any Valve Problem. Catalogue 8 sent free on request.

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Wolverine Tank Balls

—Guaranteed—

The ball with the reinforced top which makes elongation impossible.

Made of the finest rubber and will outwear three ordinary tank balls.

Our full line of Quality Rubber Goods is at your command, and if you want to give satisfaction all the time, use only Wolverine goods.

Canadian Wolverine Company
Limited
CHATHAM, ONT.

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COMPODISK

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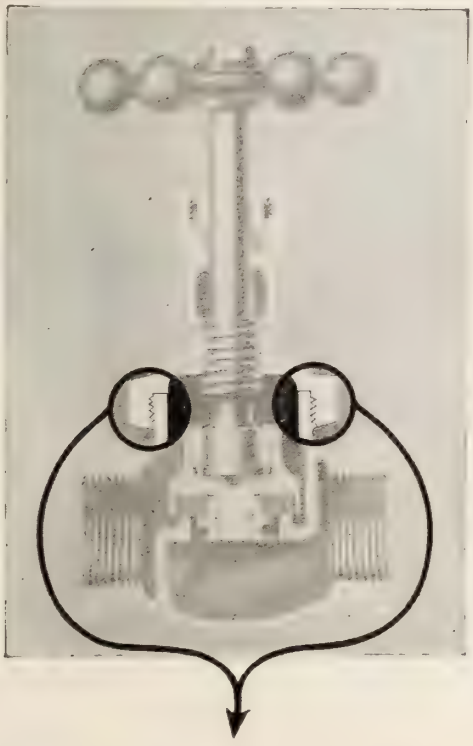
BRASS VALVES

"QUALITY FIRST"

The name COMPODISK is cast on every valve



The name COMPODISK is cast on every valve

OUTSIDE THREAD CONSTRUCTION

STRONG WHERE OTHERS ARE WEAK

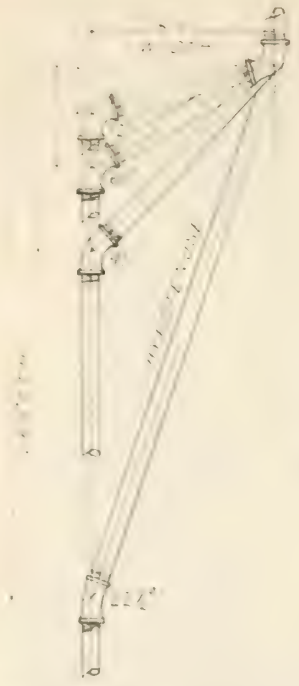
Some of the Advantages

1. The connection is non-corrosive because the **threads**, (see cut) are on the outside, away from the action of steam and water, making it impossible for them to become limed up and corroded.
2. The connection is stronger, more rigid and always steam-tight.
3. Prevents straining or spreading of bonnet end of valve which causes a loose fitting and unsafe bonnet—Safety First.
4. It prevents stripping off threads.
5. It permits easy accessibility to the valve at any time without injury to any part of it.
6. It is the only correct mechanical method of fastening bonnet to body of valve.
7. The external thread construction permits of a more compact shaped valve, consequently a stronger one.
8. The Discs are interchangeable with other standard makes on the market and will not crack or flake; a fault so objectionable with most discs now on the market.

FOR SALE BY LEADING JOBBERS EVERYWHERE

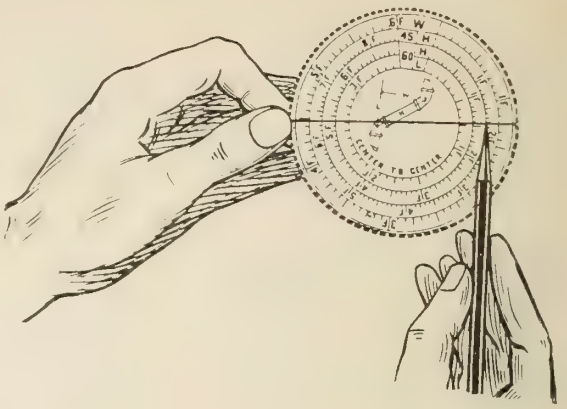
Manufactured by

Penberthy Injector Company, Limited, Windsor, Ontario



Angle Measurements made easy with

Kolar's Pipe Fitters' Scale



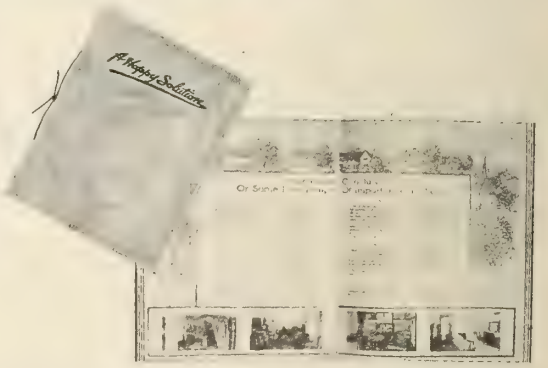
For Plumbers, Gas and Steam Fitters and any mechanic who has pipe angles to measure.

EASY — SIMPLE - CORRECT

Kolar's Scale is to assist mechanics, contractors and architects, in cutting angle pipe, making estimates, or figuring plans. It will save you hours of time. With your centre to centre width, it gives you the Hypotenuse and length, in an instant. You can take measurements from one inch to any length. It being circular and graduated on either side, makes it possible to give the largest range of measurements in the most compact form.

For sale by jobbers, hardware stores, and fine instrument dealers, or by sending the price to the Kolar Mfg. Co., 203 Adams St., Portland, Oregon, U.S.A. Use the scale 10 days and if not satisfied, return it and we will return your money. Over 3,000 sold. Not one ever returned. Made in two styles. Brass disc scale, $2.00; Celluloid Composition, $1.00.

A Happy Solution To Boiler Selling Problems



H[illegible] book that solves your boiler problems all along the line.

[illegible] boiler prospect's heating [illegible] the things he ought to know about heating systems, [illegible] the goodness there [illegible] its economy, its [illegible] Makes him warm [illegible] to this Burnham Cosy Comfort Heat and want to know more about the boiler that's back of the heat.

[illegible] you with that want to know more desire, it's gone a long ways towards solving the biggest part of your selling problem.

This Happy Solution Book of ours didn't "just happen." We worked on it for almost three years before we thought it was ready to go out and help you sell boilers. It represents a careful study of your every-day selling problems, and reflects a practical knowledge of just what you fellows out on the firing line are up against.

We'd like to send a copy of the Happy Solution to every one of your boiler prospects. Send us their names and it will go to them first mail.

At any rate, write for **your** copy.

Lord & Burnham Co. Limited of Canada

Royal Bank Bldg., TORONTO

Burnham Cosy Comfort Heat

Factory: ST. CATHARINES, ONT.

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COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

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Limited

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PALACE OF THE KING OF THE BELGIANS
BRUSSELS

--Good Files Promote Efficiency

You cannot get away from the fact that when a man is working with a good tool his pride in his work increases. A file worn smooth irritates the most even-tempered workman, while the high-strung, skilled mechanic who works with a bad file for half an hour costs his employer more in wasted mental and physical energy than possibly a dozen files may cost him—in the final results.

Educate your men to throw away their files when they reach their "inefficient point." It is economy. It is efficiency. It promotes good temper at the bench.

The Famous Five Are:

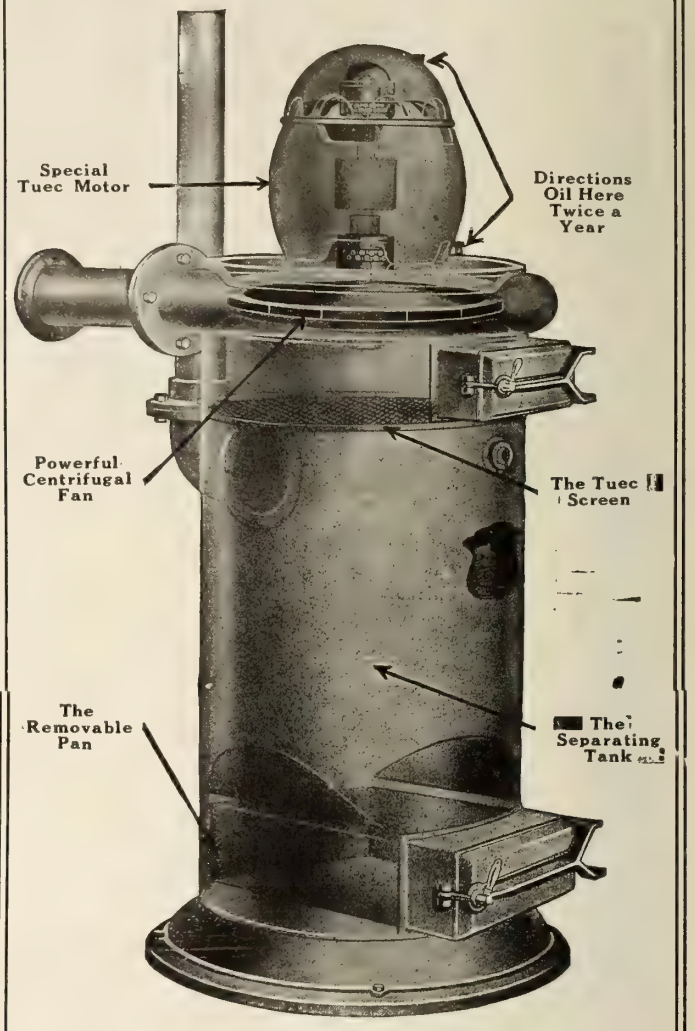
KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

(Made in Canada)

Have You Installed

A TUEC Yet?

If Not! Why Not?



Note the simplicity of the TUEC.

There's more credit due you, if you install a TUEC in the home of your friend, than if you agreed to pay his doctor's bill. Why! Because when you install a TUEC system in his home you eliminate to a great extent the cause of the doctor's bills.

Scientists tell us there is nothing more insanitary than a dust-laden home, and every time you put a TUEC in a house you improve the health of the occupants of that home greatly.

Further when you install a TUEC, you know that you are putting in a machine that will clean a larger area in less time, at a lower cost and for a greater number of years than any other method of cleaning.

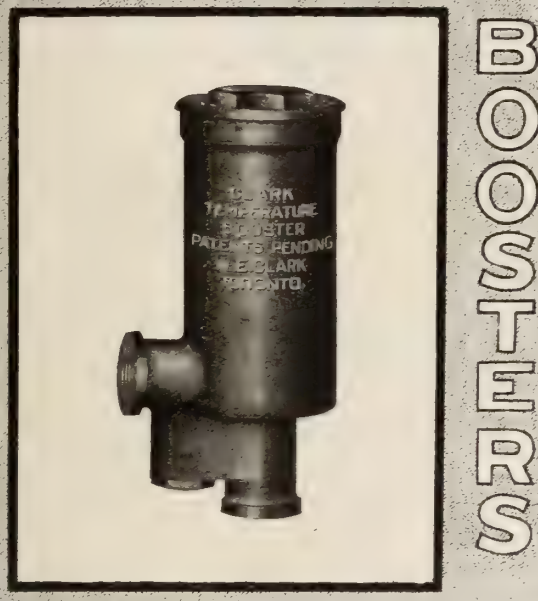
Write us at once for our proposition.

United Electric Co., Ltd.

159 West Richmond Street
TORONTO

CLARK

TEMPERATURE BOOSTERS



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Cures a slow, sluggish Hot Water Heating system.

Makes a new installation better than a gravity job, and does not cost any more.

Acknowledged by all to be the best device in existence to increase the circulation in a Hot Water System.

MADE IN CANADA ONLY

W. E. Clark Company

28 Adelaide Street West

TORONTO, CANADA

SPEAKMAN "UNIT"

Fixtures Will Fit Any Standard Lavatory Drilling

—and give you an opportunity to supply your customers with a high-grade, up-to-date combination fixture at a price about the same as two high-grade faucets and a waste. There's a handsome profit provided for you, too.

These fixtures possess the well-known Speakman quality and workmanship, and their installation is most convenient and practical, because:

These fixtures fit practically any lavatory. The "Unit" lavatory, without overflow, drilled for bi-transit waste and two faucets. The "Unit Acto" (with pop-up waste) fits a lavatory with overflow, drilled with hole for chain, stay and two faucets.

Supply valves can be rewashered from top. Bi-transit waste has ground metal seat. China escutcheons furnished on supply valve at small extra expense, if desired.

See a sample of this fixture. Delivery is made promptly from our Toronto stock.

SPEAKMAN SUPPLY AND PIPE CO.

RIVERVIEW WORKS

WILMINGTON, DELAWARE

WILMINGTON SUPERIOR SPEAKMAN QUALITY DELAWARE

SANITARY ENGINEER
PLUMBER AND STEAMFITTER OF CANADA
Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, JULY 15, 1916 No. 14

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EDITORIALS

The Country Trade—Estimates Free—Before Next Convention—The Duty of the Craft.

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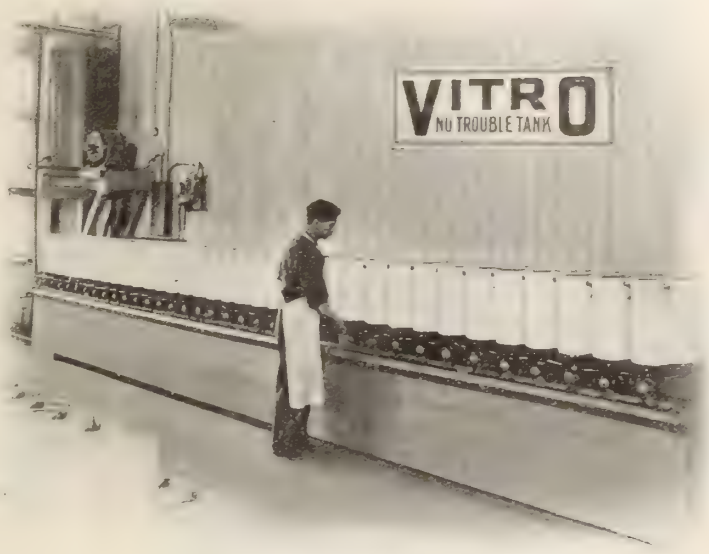
NO TROUBLE

VITRO Guarantee

A New Tank will be given to replace one that at any time proves defective from either material or workmanship.



A VIEW OF OUR TESTING DEPARTMENT

NO JOINTS TO OPEN UP

NO LININGS TO LEAK

WHEN YOU SELL A *VITRO* Tank you sell lasting service. There's no time limit to our guarantee. Over a quarter of a million now in active service.

MARITIME PROVINCES—The Jas. Robertson Company, Limited, St. John, N.B.

QUEBEC PROVINCE—Mechanics Supply Company, Limited, Quebec, Que.

CLUFF MANUFACTURING COMPANY, LIMITED

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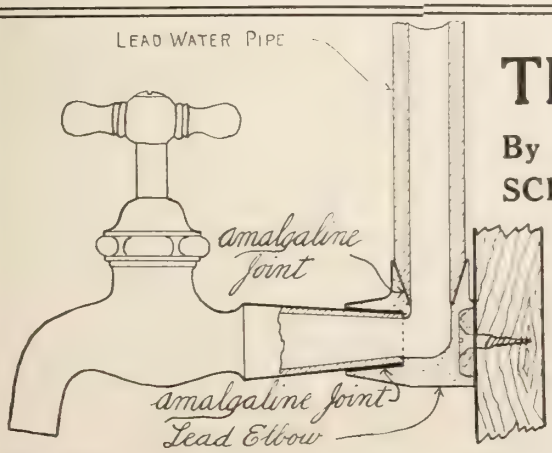


THE SCIENTIFIC JOINTER

By using AMALGALINE on your jobs you make REAL SCIENTIFIC JOINTS. Note patches of solder.

Note the neatness of the accompanying illustration.

SOLD IN 50-FOOT REELS WRITE US FOR PRICES

Amalgaline Company of Canada

186 Manning Avenue, Toronto

Phone College 3114

THE SANITARY ENGINEER

VOL. X. JULY 15, 1916 No. 14

Outstanding Accounts: Collect Them

Money on the Books is in Most Part Like the Bird in the Bush, It Needs Catching, Not Frightening Away, and If Collecting Accounts is Necessary in Your Business It Should be Done in a Diplomatic and Systematic Manner.

By Prof. Arthur Bateman.

HOW much money have you in other people's hands? Have you any slow-paying customers or any bad debts? Have you a systematic method of making collections, or do you wait until hard pressed for money, then beg and plead for a settlement?

Does the collection of accounts form part of your regular business routine, or is this all-important branch of your business treated in a haphazard way?

It is pretty safe to assume that every business man has outstanding accounts and bad debts, and could utilize such money advantageously in conducting his business on more economical lines.

Collect this money, then. There is neither insult nor harm in asking a man for the money he owes you in exchange for your material and services, and no man with integrity will feel offended if approached in the proper manner.

Of course, each customer is not alike, but in every instance your money should be collected by persuasion rather than force, and, above all, the good-will of the customer must be left intact.

Some people are wealthy and usually prompt in their settlements. They simply need reminding that their account is past due. Others have very moderate means and need coaxing to make prompt payment, while a third class are the "Oh-let-it-go" type, and will not pay until threatened.

How, then, can we best collect this money speedily and inexpensively? The question is solved in the multigraphed form letter, which should be followed up monthly.

It is a difficult matter to detect a multigraphed letter from a type-written one, and if efficiently prepared will carry your message to all your distant readers in such a manner that it will receive the attention due to a personal communication.

First, have the letter multigraphed — may differ [illegible] and sign by hand. The name and address of each party can, if so desired, be filled in on the typewriter. Next compile a list of those customers holding your money, and transfer this list to index cards; then mail your letters, using 2-cent postage, at intervals of one month each.

Prof. Arthur Bateman.

The first letter should remind them of the account and solicit an order at the same time.

Letter No. 1

Dear Sir:—

Enclosed please find a statement of your account which became due July 1st. We assume that this has escaped your attention, and will greatly appreciate a prompt settlement.

Our stock of sanitary fixtures was never more complete to meet the demands of our customers than they are to-day, and this is a most opportune time to carefully consider the sanitary conditions in your home.

An order for our fixtures and services will be as welcome as your check.

Very faithfully yours,
S. ENGINEER & CO.

The second letter should ask for payment, yet show willingness to serve them.

Letter No. 2

Dear Sir:—

Last month we wrote you concerning the enclosed account, but as we have not heard from you, fear that it has been overlooked.

As this account is now past due, we would respectfully ask you to mail us cheque at your earliest convenience.

Our skilled services are ever at your disposal, and please remember we can prevent more disease than all the doctors in Canada can cure.

Very faithfully yours,
S. ENGINEER & CO.

The third letter should be centred on the question at issue alone, and a reason be shown why the demand should be met.

Letter No. 3

Dear Sir:—

You would receive our letters of July 1st and August 1st, in which we respectfully asked you to mail us cheque covering your overdue account, but you have not replied to these.

We know you intend to pay this, but in these days of keen competition we have to pay cash for all our material, and consequently must have prompt settlement of our accounts, otherwise we cannot quote you such low prices for our high-class appliances.

Kindly accept this view of the matter, for our money is in your hands, and let us have a remittance covering your account by return mail.

Expectantly yours,
S. ENGINEER & CO.

The fourth letter must be stronger, and insist upon at least part payment, and should embrace a veiled threat.

Letter No. 4

Dear Sir:—

Again we are reluctantly compelled to write you concerning your very much overdue account.

On three different occasions we have

written you, but you have not replied to any of these letters.

We hate to see the names of our old customers removed from our books, but we are vitally interested in the debit standing against your name, and must insist upon immediate settlement of your account.

Your patronage is highly appreciated by us, otherwise we would have forced a settlement much earlier, but if you will send us part payment of your account per return we will still have patience and refrain from adopting harsh measures.

Kindly reply at once and oblige,

Yours respectfully,

S. ENGINEER & CO.

If the above four letters fail to bring a reply, little sympathy need be shown, and it should take the form of a direct threat to recover in a legal way.

Letter No. 5

Dear Sir:—

You have neither sent us cheque covering the amount of your account, nor given any reason for not doing so.

We have been as patient and respectful as possible all this time, and in return you have treated us with contempt.

Our only alternative now is to give you ten days in which to settle in a friendly way; the matter will then be turned over to our lawyers to recover the amount in the business way lawyers adopt.

This procedure is distasteful to us, and we sincerely trust your good name will remain untarnished by a settlement within ten days.

Yours very truly,

S. ENGINEER & CO.

Have you ever stopped to realize how serious a matter it is for you to let your supply house guess the reason why you do not pay a bill that is due? If the jobber sells you his goods on thirty days, the goods should be paid for in thirty days; but it is occasionally inconvenient for you to send him a check at that time and sometimes you allow sixty or ninety days to run.

When this condition exists, the manufacturer or jobber naturally becomes insistent, and if, instead of ignoring his request, you would write a frank explanation and ask for an extension, there is not one jobber in a hundred who would not gladly extend your day of payment. He then, of course, would expect payment made when the payment came due.

If you do ignore his statement and his letter to you, you at once allow him to guess the reason for the delay. You have opened the channel of suspicion and at once lowered your credit.

Every time it becomes necessary for a jobber to write other houses with whom you deal, you have, perhaps unconsciously but nevertheless surely, started the second man looking out for his own account. Many a sanitary and heating engineer has lost his high rating and the good opinion of those with whom he deals by not remembering that the jobber is entitled, firstly, to his money, and if that is not convenient when due, then he is at least entitled to a frank, courteous letter from you, asking for the extension and promising payment shortly thereafter.

A letter of this kind would also promote the feeling of good-will and confidence that must be established between good business houses.

The next time you are not able to meet the thirty-day bill on time, instead of passing the first statement over without attention, try writing him and stating that you cannot pay at that time but will pay on a slightly later date. Then keep the promise in whole or in part, at least pay something.

You will find at once that you have increased your own self-respect, and you will increase the respect the jobber has for you and for your establishment.

There is no one thing in all classes of business that is more profitable than discounting your bills; there is no one thing in business more imposed on than discount dates; there is no one thing in business that impairs your credit half so fast as not paying on time or, if unable to pay, allowing the manufacturer to guess the reason instead of writing him frankly yourself.

It appears to be true in all lines that the house which is most careful in seeing that its payments are made on time is the most respected. Good credit in these days depends on buying goods on the right terms and seeing that the payment is made on those terms.

Rural Sanitation

A Continuation of the Sanitary Science Course That Has Been Appearing in the Sanitary Engineer, But Having Particular Reference to the Sanitary Disposal of Household Wastes in Unsewered Districts

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 6

Sub-Surface Irrigation

ADMITTED to be one of the best recent works on sewage disposal is a book by that title by George W. Fuller, Consulting Engineer and Sanitary Expert; it contains the following statement:

"Under favorable conditions it (sub-surface irrigation) is probably the best arrangement to adopt for isolated residences and for very small institutions."

Messrs Rafter and Baker in their "Sewage Disposal in the United States" may be quoted as follows:

"Sub-surface irrigation is a useful modification of broad surface irrigation applicable to relatively small quantities of sewage as from isolated hospitals, prisons, asylums, summer hotels, manufacturing establishments, or any other place without access to the sewage system of a large town."

As now understood, the disposal of sewage by the sub-surface irrigation method consists essentially in the distribution of sewage by means of open-jointed tiles over the soil at a depth of a few inches below the ground surface.

Before investigating the bacterial and chemical changes occurring in such a system of sewage disposal it is proposed in this article to trace the development of the process not merely on account of the historical value attaching but also because of the practical educational value. To anyone endeavoring to successfully vary or improve a recognized process, the mistakes known to have been made in its development can be avoided.

In England in 1863, the Rev. Henry Moule introduced the system of earth closets. His object was to use the fertilizing value contained in human excreta and also to immediately disinfect the feces. In seeking means for the disposal of liquid sewage or wastes of the household (for which he found the earth closet not so well suited as for the disposal of solids) he experimented with agricultural tile laid along the foot of a grape vine trellis. The tiles were laid with open joints and the slops of the household escaped freely into the ground.

Such was the fore-runner of the modern sub-surface method of sewage disposal. This method, however, no doubt owes its practical utility and popularity to the invention in 1868 of the automatic flush tank, by Mr. Rogers Field. In

disposing of the liquid wastes of cottages at Shenfield, Essex, England, the liquids were retained in a flush tank until the tank was full. Then by means of the Field syphon the whole volume was automatically discharged into the tiles. Without this invention of the flush tank very little would likely have been heard of the sub-surface irrigation method.

Although originating in England this method has been more extensively studied and used in America due to the efforts of, among others, such sanitary engineers as the late Col. George E. Waring, Jr., the late Edward S. Philbrick, George E. Olcott and Wm. Paul Gerhard, all of whom have written papers or books on the subject.

The last report of the British Royal Commission on Sewage Disposal dated the 11th of February, 1915 (which in part deals with the disposal of liquid and solid domestic refuse in rural areas) would indicate by the entire ommission of any reference to the sub-surface irrigation method that it is at present little used or even considered in the Old Country. It is given as the general conclusion of the Commission that:

"Where there are isolated dwellings which it would be very costly to connect with the drainage system of a district, the cesspool is a possible alternative where there is no danger of polluting water supplies."

It is doubtful if any sanitarian of note on this side of the water would commit himself to such a statement; there is always the danger, even though it may be granted in some cases to be very remote, of polluting water supplies from a cesspool. Sir William Ramsay, one of the Commissioners, differs from his colleagues as regards their statement that the domestic waste water may with advantage be conveyed to a cesspool. The report referred to contains his minority report or memorandum. His opinion of the cesspool is largely in accord with American views on the subject and is as follows:

"Where water is used the "cesspool" or "cess-pit" comes into operation. This is a deep pit in the ground; local regulations insist on its being so cemented as to be water-tight, hence, if properly made and maintained, there should be no leakage, and, as it is covered, no evaporation can occur. The drainage of the houses, faecal matter, urine, slops, scullery-water, bath-water, etc., all may find their way into the cesspool, which sooner or later becomes full. This involves emptying and getting rid of the filthy semifluid mass. It is either a costly or a very disagreeable operation, and there is always great difficulty in disposing of the refuse without annoyance from stench. As a matter of experience, in spite of regulations, cesspits are rarely tight; it is the almost universal custom to make a hole in the cemented bottom so that the liquid portion of the filth, may soak into the soil. It is obviously not an easy task for a local authority to ascertain whether or not a cess-pit is tight, and, indeed, the task would be a most unsavoury one. Needless to say the inspector turns his blind eye on cess-pits, and, so long as no outbreak of disease occurs, sleeping dogs are allowed to lie. A cess-pit may be defined as a practically permanent septic tank, emptied only at long intervals, or, if leakage takes place, probably not at all. No doubt a certain digestion of the solids occurs, but no experiments have been made on the subject so far as I am aware."

Dr. G. V. Poore, Professor of Medicine at University College, London, England, while not an advocate of sub-surface irrigation as understood in America is undoubtedly familiar with the purifying action of the soil which is the underlying principle in sub-surface irrigation. From his experience and experiments, extending over many years, with the disposal of fecal matter and household wastes from cottages he concludes:

(1) That putrescible refuse should not, where it can be avoided, be mixed with water.

(2) That all putrescible refuse, whether mixed with water or not, should be dealt with on the surface of the ground, i.e., in the upper layers of cultivated soil.

His first conclusion implies that fecal matter should be collected and treated separately. He advocates that the feces should be deposited in pails, collected daily and disposed of in shallow parallel furrows less than nine inches deep and then covered with earth. Cabbages may be planted for a first crop and then other vegetables may follow for later crops. This trouble of the daily collection of fecal matter is generally avoided in American houses especially in those supplied with running water. In such cases the solids are water-carried but are broken up and partly destroyed in a septic tank.

With regard to the disposal of liquid sewage or slop water, Dr. Poore points out that domestic slop-water is not foul smelling until putrifaction sets in, and this putrifaction should not be allowed to occur. His plan of getting rid of slop-water is to have all waste pipes of sinks, etc., terminate at least 2 feet 6 inches above the level of the ground; the sinks are not trapped and between

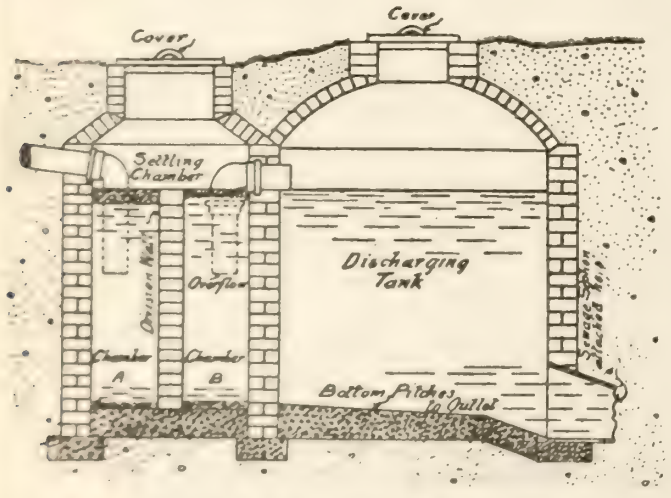


Fig. 18—Section of Settling and Discharging Tanks.

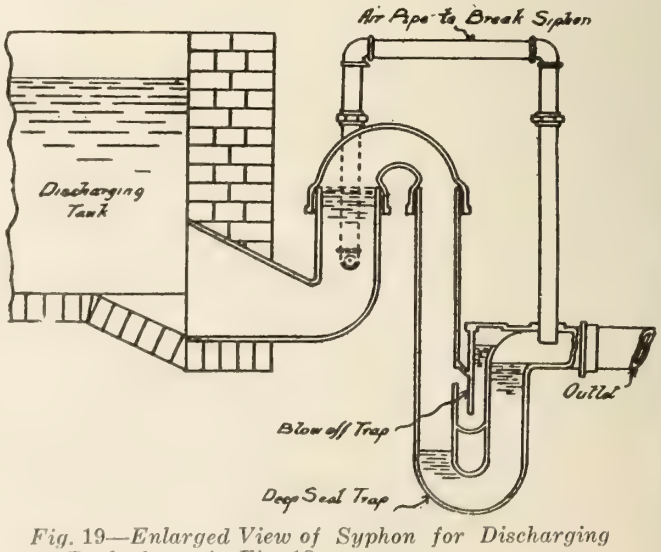


Fig. 19—Enlarged View of Syphon for Discharging Tank shown in Fig. 18.

the waste pipe and the ground there is interposed a strainer and a coarse filter. The strainer is a basket with some straw in it which requires to be changed once every week or every two weeks. The filter may consist of an old bucket, with the bottom perforated, filled with coke or clinker varying in size from peas or marbles at the bottom to walnuts at the top. The effluent from the filter runs into a "filteration gutter", consisting of a perforated gutter of cast iron, nine inches wide, with horizontal flanges, accurately adjusted with a very gentle slope by placing loose bricks at the junctions of the lengths of guttering. Broken stone is packed in the trench under the gutter, which need not exceed 8 or 10 feet in length. The cost is given as 37½ cents per foot. Dr. Poore advises that the sides of the gutter be planted with some plant which likes moisture, such as black-currant or raspberry. He believes it important to have an open and not a closed gutter, so that air and light may have free access to the slop-water. To lessen the risk of saturation of the soil it is an advantage to take waste waters in different directions.

Even in country homes where water closets are insisted on, Dr. Poore thinks it would be a good plan to treat night soil separately and to allow slop-waters and urine to flow in open gutters. In contrast to this necessarily troublesome and possibly unsightly method of sewage disposal the sub-surface irrigation method undoubtedly possesses many advantages. One advantage is that ordinarily no labor is involved in operation and further all the disposal takes place out of sight without offence to any of the senses. In Canada in the winter Dr. Poore's method would be impracticable.

However, Dr. Poore's method has been explained in some detail as illustrating English practice in some localities. It can, no doubt, be admitted to be a sanitary method as Dr. Poore proved by experiment. In the middle of his garden, the soil of which had been treated with fecal matter he constructed a well 5½ feet deep, with a diameter of 2¼ feet. The sides of the well, which is covered, are lined with concrete pipes to the very bottom, and around these 4 inches of concrete have been run in to give additional protection. The water, which is the effluent from the treated garden soil stands only 3½ feet above the sandy bottom of the well but was found to be bright, colorless, odorless and tasteless, and singularly free from bacterial contamination as was proved by examination in 1891 and again in 1902. Dr. Poore for ten years drank the water and apparently suffered no harm. He found that 8 or 10 feet of soil filtration sufficed to purify any product from the soil in which fecal matter has been buried.

The pioneer in America for sub-surface irrigation systems was undoubtedly the late Col. Geo. E. Waring, Jr., who in 1869, knowing of the early developments in England, experimented on the same lines. He found that with a flush tank only that the tile became clogged at their joints with grease and flocculent matters and had to be taken up and cleaned and relaid as often as once a year. It is worthy of note that the difficulty was first tried to be overcome by placing a settling tank between the flush tank and the tile. The rapid discharge from the flush tank naturally disturbed the solids in the settling tank and it was then given the place on the house side of the flush tank—a place which the settling tank now always occupies in such systems.

One writer points out that Col. Waring in his endeavor to provide a suitable intercepting tank for the retention of solid matter in sewage, actually invented what is now known as the septic tank, even before it was designed by Mr. Mourns in France in 1881 or subsequently by Mr. Cameron in England (see Article 4 of this course in issue of June 1st). Col. Waring used in his design all the main features of the modern septic tank; the inlet and outlet pipes were suitably submerged and the tank was kept dark and arched over.

In 1892 in the American Architect, Col. Waring described a sub-surface irrigation method of sewage disposal which was typical of his usual practice in this respect. Figures 18 and 19 show the settling chamber and discharging Flush tank, (two very essential features of any sub-surface irrigation method) and the syphon on a larger scale. In one particular, however, his description differs from that shown in Fig. 18, for in regard to the inlet he states as follows:

"It (the settling chamber) receives sewage from a pipe turned down through the dome and barely trapped against the return of air—if deeply trapped, grease accumulates and obstructs the drain; with this slight trap, the flow from an ordinary house suffices to keep it free."

The object of the division well in the settling chamber is to aid in preventing solids getting into the tile system. The solids may be disturbed by the entrance of the sewage into the first compartment but the liquid sewage flowing in a thin sheet over the division wall does not disturb the liquid in the second compartment and the trouble in regard to solids getting into the tile is largely obviated by such an arrangement, which however is generally considered an unnecessary precaution in the ordinary small plant.

Col. Waring considers that the discharging tank should be made large enough to hold the product of at least 12 hours. He has no objection to its retaining 24 hours' supply but a longer retention would lead to too much putrefaction.

The matter of size and amount of tile required will be taken up in the next article, but Col. Waring believed that with a settling tank of the nature described there would not be enough flocculent matter to interfere with the proper action of 2 inch absorption drains or tiles (as they are frequently termed) laid in one foot lengths with one-quarter inch joints nor did he think it necessary to provide enough tile to equal the capacity of the tank.

Col. Waring also designed a simple flush tank similar to that shown in Fig. 20. No settling tank is provided but the paper and such coarse material is screened out at the inlet by means of a wire basket of 1 in. mesh made of diamond mesh No. 12 wire cloth. Hooks are provided on the side wall to hold

(Continued on page 28.)

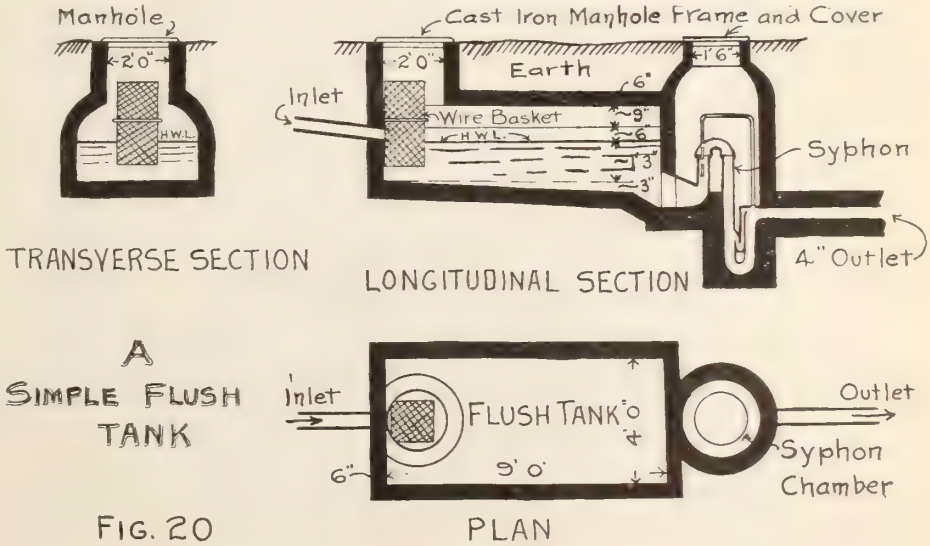


FIG. 20

Data Relating to Heating Systems

The Time to Study Heating Systems and Their Requirements is When Such Installations Are Being Installed. Many a Splendid System When Being Installed, Has Been Ruined on Account of There Being Very Little Grey Matter Used

By T. W. Reynolds*

As the water in a hot water heater system is heated from 40 degs. to 222 degs., it increases in bulk, the amount of expansion being approximately equal to one twenty-third of its volume. An expansion tank which has a capacity sufficient to easily accommodate the increase in bulk through a 200 deg. range of temperature, plus a safe margin to replace water lost through

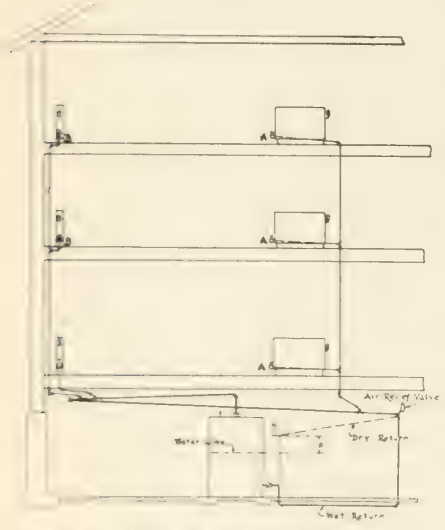


FIG. 1. ONE-PIPE GRAVITY STEAM SYSTEM.

evaporation, leakage, repairs to the system, refilling, or otherwise, and to prevent the entry of air into the system should be placed in every hot water installation. (See Figures 2, 4, 6, and 7.) It should be located two feet above the highest radiator and where the possibilities of freezing are remote. Flow and return connections are advisable when necessary to locate the tank in a cool unheated space.

The expansion tank may be constructed with a ball cock to automatically supply the water which is lost from the system. This is not advisable in a full size tank for the ball cock may rust tight and refuse to operate when required, the overflow occurring only at remote intervals. Too small a tank is not to be desired as constant overflow may cause freezing in severe weather, depending upon the tank location. The expansion tank should always be provided with an overflow pipe. This should be run on inside walls to protect it from freezing and to an open fixture in the basement, or directly to the outside. A suitable vent should always be provided on the overflow pipe to prevent it syphoning the water from the system. A direct and separate connection (usually a 1 in. pipe), from bottom of boiler to tank is best. However if connected to a riser serving a radiator on the top floor it should be from just below the radiator connection. Periodical visits to watch the water level in the expansion tank may be avoided by installing an altitude gauge connected direct to the boiler. A fixed hand on the dial is adjusted for the height of water line in the expansion tank when the system is first properly filled. The movable hand indicates from time to time any loss of water from the system due to evaporation or other causes.

Heating Systems

Systems of heating are usually designated both by the medium employed in carrying the heat, as hot air, steam and hot water, and by the arrangement of the piping. This combined nomenclature is illustrated in the following systems, all of which are in very general use: The one or two-pipe or one-pipe overhead system of steam or hot water; the one or two-pipe mechanical vacuum steam system; the two-pipe self-induced vacuum steam system, and the two-pipe pressure hot water system.

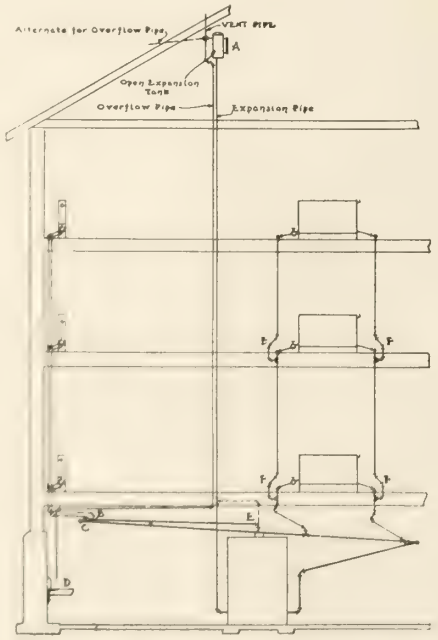


FIG. 2. ONE-PIPE LOOP HOT WATER SYSTEM.

The air systems may be gravity or pressure, either with single or multiple ducts, and the primary source of heat may be a furnace or steam or hot water in coils. Combination of air with steam or hot water systems are frequent.

In planning a low pressure steam apparatus, a warm air heating apparatus

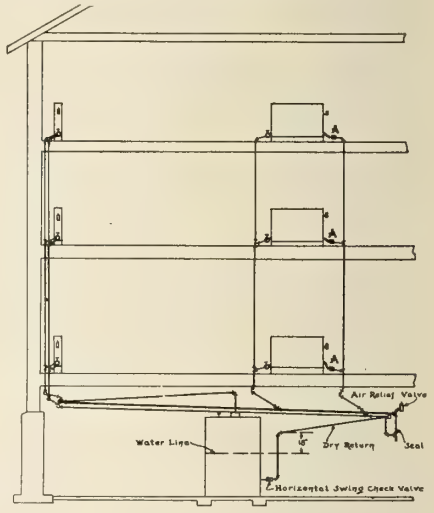


FIG. 3. TWO-PIPE GRAVITY STEAM SYSTEM.

or a hot water method of heating, we may choose between several different systems, any of which, if properly erected, will give satisfactory results. Our choice should depend upon the special conditions and the requirements governing the plant under consideration, though individual preferences, peculiarity of local conditions, etc., may affect our decision.

One-pipe Steam System

The regular one-pipe steam heating system consists of a one-main supply carried to the ceiling over the boiler (see Fig. 1), then run at a slight pitch in the direction of the branches to be supplied. The main supply must at no point be less than eighteen inches (preferably higher) above the water line of the boiler, and should extend full size two feet beyond the last connection taken off, from whence it may be carried back to the boiler either as a dry or as a wet return. If the main is ended at the last radiator connection, trouble will be experienced, due to the steam forcing water into the radiator.

Branches are taken off from the main, one for each riser or first floor radiator, either on top or at an angle of 45 deg., and should slope upward from the main. If it becomes necessary to pitch the branch downward from the main, it must be relieved at the lowest point, and this relief pipe connected to the nearest return below the water line of the boiler. If the piping is arranged as a long circuit main, it may be necessary at some point in its run to step the main up to a higher elevation. In this event a drip should be provided at the base of the riser.

As the steam is conveyed to, and the condensation from, the radiators in the same branch and risers, it is necessary to use larger piping in the one-pipe method than is required in the two-pipe work (see Fig. 3). The condensation in the risers will flow downward, and will have a tendency to cling to the inside

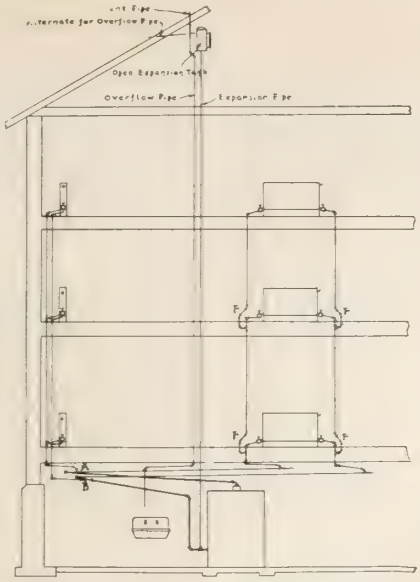


FIG. 4. TWO-PIPE OPEN TANK HOT WATER SYSTEM.

surface of the pipe, while the steam will travel upward inside this cylinder of water. In the horizontal pipes the steam flows along the top, while the water flows at the bottom of the pipe—each in an opposite direction. The end of the radiator admitting the steam should be lowest, so that the condensation will flow back freely, otherwise water hammer will result.

(To be Continued in next issue)

A company has been formed at Tainan (Formosa, Japan), for the construction of an electric tramway from that town to Port Anping, a distance of about three miles; the capital of the undertaking is said to be about $240,000; the details of the scheme have not yet been decided upon; owing to the present high price of rails it is probable that old rails will be used.

New Toronto Technical School

Specifications Described, Previous Articles Merely Mentioned the Equipment in a General Way—Plans and Layout Will be Described, Making the Following Articles Doubling Interesting.

Sanitary Engineering

THE concluding paragraphs which appeared in the June 1st issue, dealt with the heating system. In this is issue is shown a plan of the mains in the basement, which will give the reader some idea of the general layout.

This plan was followed, except where the construction of the building interfered a little with it.

For a system containing such a large volume of water, a large expansion tank was needed.

Expansion Tank

The expansion tank for so large an amount of heating is one of no small dimensions, 42 inches in diameter 84 inches long. The sides are made up of 5-16 in. steel plate, the heads of ½ inch thick steel plate, one of the heads is dished in, the other swelled out, similar in construction to an ordinary range boiler.

On the bottom of the tank a 2½ inch flange is riveted and on top a 2-inch flange.

Two ¾ inch flanged openings are provided for water gauge glass, one on top the other on the bottom.

This tank is also connected up to the Toronto city water service. The water passes through a Mueller automatic water feed valve.

The overflow is run to the nearest drain or waste pipe.

The completed tank was also subjected to an hydraulic test of 150 lbs. per square inch.

The pumps used to circulate the water through the system had to be built to specifications which would not only ensure perfect working, but would also stand up, under very hard usage. The following specifications will prove of unusual interest to the reader.

Circulating Pumps

To ensure a positive circulation of the water for such a large heating system required two large single stage centrifugal pumps 10 inches in diameter.

These are directly connected to single-stage impulse turbines without gears.

The capacity of the pumps is 2,100 gallons per minute against an 80 foot head.

The specifications in connection with these pumps are about as interesting as could possibly be even to demanding a set formula from which the bearings and impellers had to be made. The latter were of bronze made with the following percentage of metals:—Copper 88 per cent., tin 10 per cent., and zinc 2 per cent.

The shafts had to be made of open hearth forged steel polished, turned and ground to size, and the portion of the shaft that comes in contact with the water has to have bronze sleeves shrunk on to overcome any action which the water would have on the bare steel shaft. These pumps are connected up to steam turbines by means of steel flexible couplings made of two steel flanges fastened together with steel studs provided with rubber cushions. The turbines are of the single stage impulse type. The wheels turned from solid steel forgings and polished smooth. Each nozzle is made of steel, made removable and with individual control valves.

Working Pressures

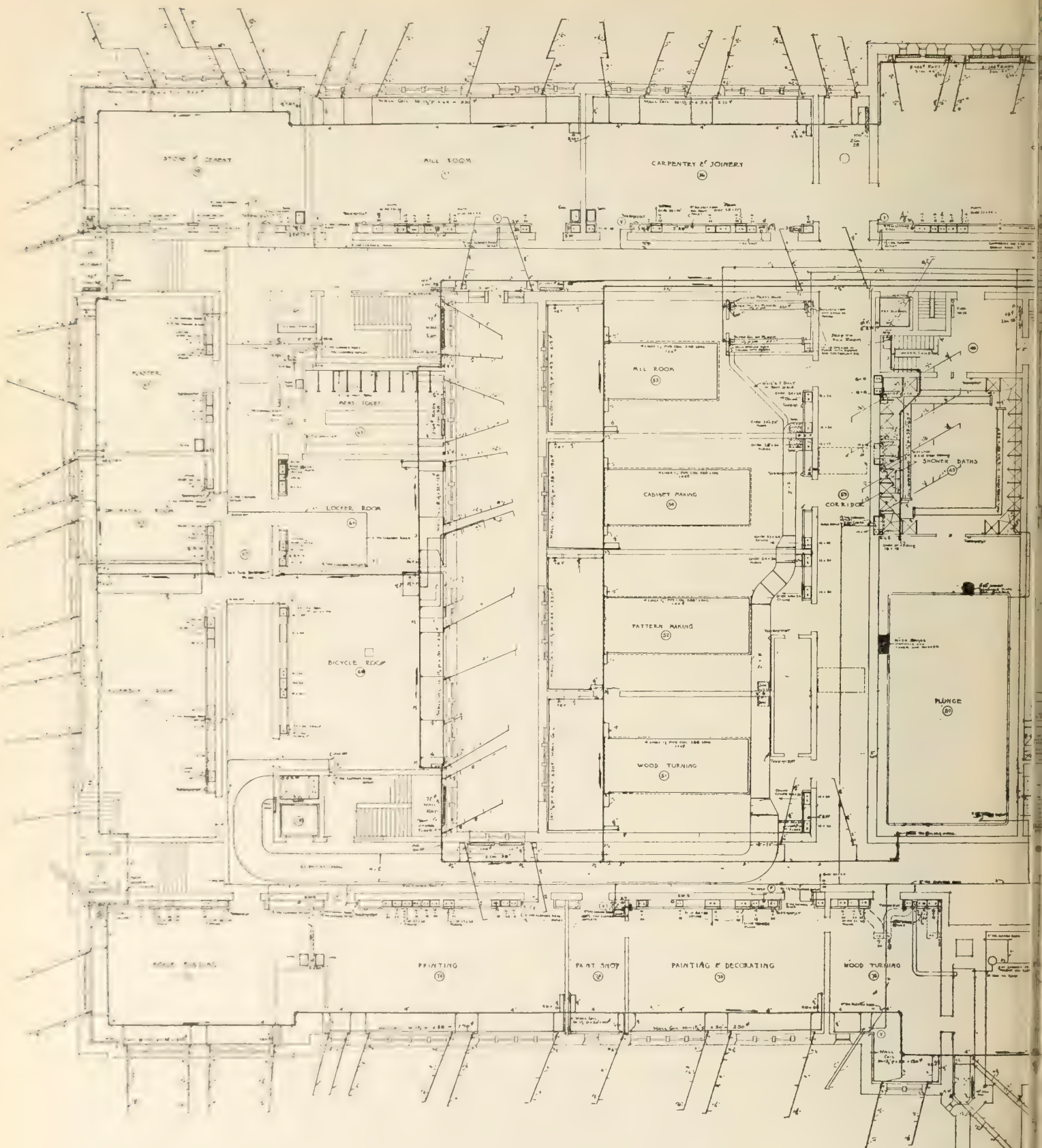
The steam pressure required to operate these pumps is not less than 80 lbs. per square inch with a back pressure of not more than 3 lbs.

The manufacturer of the pumps had to guarantee an efficiency of not less than 70 per cent. under the pressures just described and temperature of the water not less than 250 degs. Fahr.

Thermometers

The hot water heating mains are furnished with round brass-faced dial thermometers 4 inches in diameter, in the following locations: One on the inlet and one on the outlet of the exhaust heater. Also one on the inlet and outlet of the live steam heater.

The exhaust steam tank is also fitted with similar thermometers, on the top and bottom. Each main, flow and return



Plan of hot water heating mains as installed in the Toronto New Technical Scho

header, between circulating pump is also

Hot water thermometers to read from

Exhaust steam thermometers to read from

Steam Traps

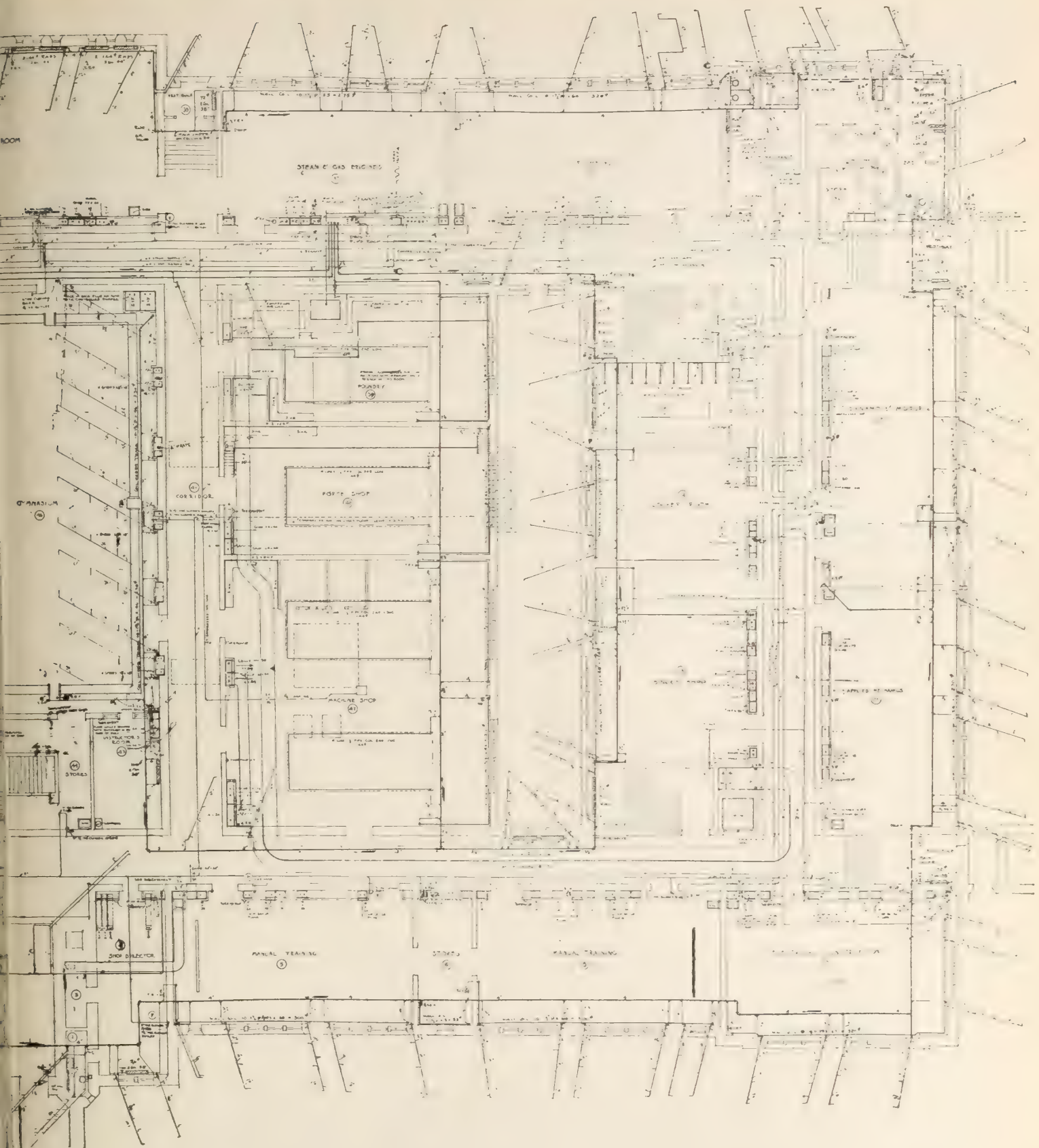
A number of steam traps are installed where required, each having full size bypass, and in some cases are furnished with shelf supports.

The high pressure traps all discharge into the feed water heater and traps on the exhaust piping discharge to the sewer through a blow off tank.

Ventilating Fans

The two ventilating fans are situated in the sub basement and had to conform with the following specifications:

Each blower is of the double width, full Houser Multivane type with 45 degs. up-discharge. Each made up with two wheels at least 70 inches extreme diameter and has two wrought iron spiders keyed and bolted to the shaft. The shaft to be made of the best grade



t also shows the general layout of the various rooms in the basement.

of steel 5 inches in diameter, turned ground and polished.

The housing of these wheels is made up of 11 gauge steel plate properly stiffened with angle iron, the inlets are 72 in. in diameter.

The size of the casing is approximately 8 feet wide with an outlet about 5 ft. by 8 feet.

The capacity of these fans when working at about 180 revolutions per minute is approximately 90,000 cubic feet of air per minute.

Exhaust Fans

Two exhaust fans are installed at each end of the building on the third floor, and connected to the toilet local ventilation system, and are equal in construction to the ventilation fans previously referred to and are operated by a 2½ h.p. electric motor running at a speed of 500 revolutions per minute.

The vents are connected to these fans by flexible rubber connection, which will to some extent eliminate noise.

(Continued in next issue.)

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THE COUNTRY TRADE

YES, sir, I am doing a very nice country business. Of course the town I live in is not very big and there is a splendid farming country all round, which may help a little, though it is very seldom a job comes into my shop. If there is, I oftener than not, look upon it with a certain amount of suspicion. I am a firm believer in getting right out after business and can generally make my own terms.'' Such were the words spoken to the editor of ''The Sanitary Engineer'' recently, when asked how business was in the country. The same gentleman replied, when asked how many pneumatic water systems he had installed last year, that he had bought 28 of various types, both hand and power driven and that be expected to instal a larger number this year.

''The Sanitary Engineer'' can see no fairer field as yet for business than the farmer or rural resident and if the trade will only devote a certain amount of time to working out sales campaigns, among these people, much business can be procured.

ESTIMATES FREE

ANOTHER case of ''Estimates Free'' has come to our notice recently which still further convinces us that estimating should be charged for, which can only be done by co-operating one with another.

A certain Toronto architect draws up specifications for the plumbing to be installed in a hospital to be erected in another city. The local sanitary engineers estimate on the work which calls for all traps to be vented and revented, etc., and the hot water supply system had, according to the specifications, to be installed so as to circulate back to the boiler.

An outside concern was given the work, but not one trap in the building has been vented and no circulating system was installed. The local sanitary engineers simply wasted so much time and were robbed of a fair chance. This is what is to be expected as long as the trade are willing to estimate free, and to hob-nob with the architect, who gets his information from sanitary engineers free, yet charges his client for that information. Anything of value should be worth its price.

BEFORE NEXT CONVENTION

THE 21st annual convention is now history; what is to be the plan for 1916-17, and what will be accomplished before the 22nd convention time comes round?

These are perhaps not exactly vital questions, but [illegible] could be accomplished.

''The Sanitary Engineer'' does not wish to be critical in any way, but what should hinder every local association [illegible] to solve and carry it? Nothing whatever.

Every locality has some urgent problem or other, some grievance to right, some progressive measure which could be accomplished. Well, such being the case, it would be gratifying to be able to look back, after the 22nd convention is over and say: ''Well Done'' of something accomplished.

Montreal, the home of the national body, the home of the founders of the Canadian Society is to be favored with the 22nd annual convention, and we all know what a grand thing it has been for the trade throughout Canada, if we will only take time to look back.

Those hoary heads which we see now and again have done wonders. They sowed the seed and those who have come after are more or less to blame if progress has not been quite as rapid as it might have been. However, Montreal will see the first year's work after the society has reached its majority, taken on its manhood, and the least each local society can do is to plan a year's work for itself, and like the words in that old song, ''The Village Blacksmith,'' be able to say ''Something attempted, something done,'' etc. The Montreal boys will feel pleased and the country will be so much the farther ahead for the work accomplished.

THE DUTY OF THE CRAFT

ON another page there appear a couple of small items reprinted from the Toronto Globe. Of ''every woman her own plumber'' very little can be said, except that putting a washer on a tap is so simple an operation that the trade would gladly see every woman capable of accomplishing it. Of course this only applies in the case of the common compression work, with Fuller taps it is different. Though no doubt the days of the Fuller tap are numbered.

Speaking of the $500 flood, it is to say the least ridiculous to blame a leaking tap for such a calamity, because if the waste or overflow were not choked up they would have taken away the water as fast as would ordinarily flow from a leaking tap. However, this is not the question. The most serious matter is that referred to in the article entitled ''Tale of a plumber's victim.''

If the incident there related is true, that ''plumber'' should be put in jail. If not the ''ex-victim'' should be made to apologize to the trade, through the daily paper. Ex-Victim while waxing humorous to some extent makes a serious charge which should not be left where it now stands. He should never in the first place have paid such a charge (we presume the amount was paid, although it is not so specifically stated). We have heard such stories before and always have our doubts of at least 90 per cent. of them.

At the same time, there is a duty to be performed right here by the respectable members of the trade. Ex-Victim's statements are serious, and unless the trade rises up in arms and demands that such statements be either withdrawn or substantiated, there is little hope of those engaged in the plumbing trade being looked upon in the future as respectable citizens.

THE ETERNAL cry—''In what way can I best develop myself?''

* * *

ABILITY, ambition and work—the heavenly triplets.

* * *

A MAN is rarely promoted into a bigger job. It gravitates to him because he is well trained and capable.

* * *

WHAT ARE YOU doing day by day, week by week, and month by month and year by year to build up your personal assets of business knowledge and producing ability?

Manufacturers Please Write

Our Future Export Trade

NO one will deny that one of the most important assets a country can have is a good export business.

Canada is like a big business concern, the more she sells to someone else, the richer her people will become, providing of course that she sells at a profit.

Canada has great chances to become one of the greatest exporting countries in the world, because she can grow and manufacture a great deal more than she can consume. When this war is over, there will be a great influx of labor of all classes. The products from this labor, and Canada's natural resources combined, will, after home needs are filled, remain to be disposed of as exports.

When a country absorbs her own wealth and production she must either borrow from some other country, or must export heavily.

The Sanitary Engineer has received several very important letters from a number of responsible concerns in New Zealand who desire to import a number of lines used in sanitary, heating, lighting and ventilating engineering.

These lines include all kinds of cast iron, enamelware, brass goods, gas water heaters, gas mantles, rubber goods, hose, etc., cast and malleable iron, black and galvanized fittings and pipe.

The Editor is particularly desirous of knowing the names of firms who wish to be represented in New Zealand, that are not already exporting to that country. Details of prices, terms, shipping quantities and any other matter which will assist the manufacturers to do an export business with our colonial friends will be gratefully received at the office of The Sanitary Engineer and any assistance that we can give is at the disposal of the trade.

EDITOR.

Analysis of Canadian Sanitary By-laws

Being a Proposed By-law to Regulate Sanitary Engineering Construction in the City of Ottawa—The Sanitary Engineer Takes Full Responsibility for All or Part of Any Criticism Made on this By-law.

The last section commented upon in this series of articles, was that of section 69, in the June 1st issue. The remainder of the sections will be dealt with in regular sequence, beginning with section 70, which reads as follows:

Section 70. Every connection between lead and iron pipes shall be made with brass thimbles, ferrules, solder nipples or ground-in unions, having properly wiped joints, and ferrules, shall be properly gasketed, leaded and caulked into the pipes.

Section 71. Brass thimbles, ferrules, or solder nipples when used for venting closet shall not be wiped into the closet bend, pipe or trap. All brass thimbles shall be increased in size at the top so that the lead pipe will enter full size.

Section 72. All ferrules for 4-inch pipes shall weigh not less than 2½ lbs., for 3-inch pipe not less than 1¾ lbs., and for 2-inch pipes not less than 1½ lbs. Each ferrule shall not be less than 4 inches in length.

Section 73. No lead waste or water pipes are to be used under tile floors. They shall be of copper, brass or galvanized iron pipe. On waste lines recessed fittings shall be used.

Section 74. All lead pipes shall have proper wiped joints.

Section 75. All pipes are to be properly supported.

Section 76. Where the closet trap is above the floor, the connection of the same with the soil pipe shall be made with lead bends, or with lead pipe and cast brass floor flange with white lead and putty, said brass flanges are to be not less than 3-16 of an inch thick.

Section 77. No closet or other convenience which permits the escape from any part of it, or from the drain or soil pipe connected with it into the building of air or gas, or which permits any accumulation of filth in or about it, shall be fitted up or used. All closet seats shall be of the Post Hinge pattern. No range closets, hopper, washout or Richelieu closets will be allowed.

Section 78. No arrangements shall be made for supplying water to water closets or urinals except by self closing cocks unless the water supply is metered; and no work shall be placed for the purpose of cleaning water-closets or privy vaults by waste pipes from wash basins, or sinks or by other improper means; but all closets and urinals shall be fitted up with the proper fixtures and appurtenances belonging to them respectively.

Section 79. No persons shall locate or cause to be located any water closet in any sleeping room, or in any room, apartment or vault which is not in direct communication with the external air by means of a window or air space having an area of two (2) sq. ft. for the first storey and increased ten per cent. for each storey it passes through.

Section 70 is general, though we see no reason why the wiped joint should be in every case demanded. There are other methods of making joints than wiping, which are without doubt equally as substantial. What should be demanded is an approved joint which will withstand all or more than a wiped joint.

Section 71, too, is not quite what it might be. Instead of increasing a portion of the ferrule only, so as to allow the lead to enter, the whole ferrule should be made so that the lead pipe or bend will enter the ferrule snugly.

These brass ferrules are too small to enter the cast iron hub or a soil pipe or fitting which means that too much caulking lead is used, which is not conducive to making a good caulked joint every time.

An improvement could also be made in Section 72, in this way, besides the length and weight of the various sizes being defined, the material should also be brass free from ferrous metals. Better demand that red brass only be used in making these ferrules.

The reason why such a suggestion is made is that occasionally a very cheap grade of ferrules is placed on the market. These are composed of a mixture of the very poorest grade of scrap yellow brass, and iron filings, and are sometimes melted in with the brass. This not only cheapens the material, but also makes it difficult to wipe a joint as well as prevent perfect tinning.

Section 73 is to be commended. It goes to show that those who assisted in compiling these clauses were practical men, and know why lead pipes should not be laid under tile floors. While on the face of such a demand it may look like a needless expense, the enforcing of this section will result in better and more durable work being installed.

With Section 74 we do not entirely agree, as stated before we do not think the wiped joint should be held up as the height of perfection. What should be stated is that cup joints, overcast joints and other joints which have not proved up to standard or durable would not be permitted.

Section 75 is general and needs no comment.

The first part of Section 76 is O.K., except the paragraph which demands that white lead and putty be used to make the joint between the bowl and the floor.

This joint should be given more importance, for instance, if the floor be wood, then the part directly under the bowl should first be painted with a white lead paint containing a small portion of good varnish. Then the flange or recess on the bowl should also be painted with this mixture, and just before these surfaces are dry, the joint should be made.

If, however, the floor is of tile, marble or cement, then this joint would be best if made with a cement mixture.

Many towns use the old rubber gasket for making the point under discussion, but the rubber loses its elastic properties, becomes vulcanized and deteriorates to such an extent as to allow sewer air to escape into the compartment in which the w.c.'s are placed.

Not only so, but the leaks are very often detected as a result of using the rubber gasket.

Section 77 is to be commended in every detail, and particularly that portion where the Richelieu bowl is mentioned. Nothing but syphonic action bowls should be allowed, and none of these should have less than a 2½ inch water seal. The section would have been improved had the demand been made that all w.c. bowls have not less than a 2½ inch seal at least.

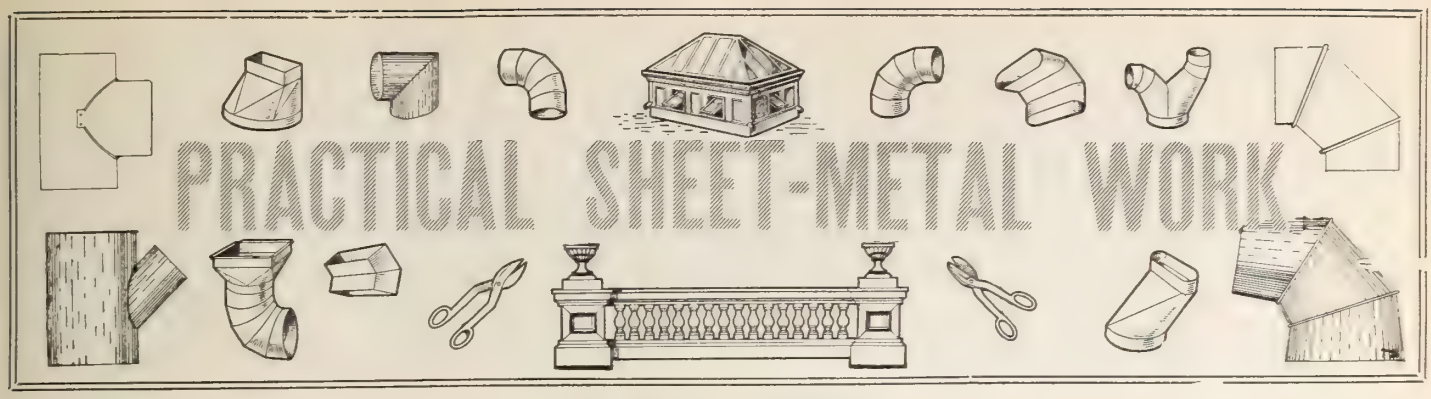
Section 78 is a very practical one, and should be enforced to the letter, as also should Section 79.

(Continued in next issue.)

JACK FROST COMBINATIONS

Above is the title of a twelve-page booklet being issued by The Empire Manufacturing Co., Toronto and London. Sectional drawings of the working parts are given which make the booklet of special value to the trade.

A post card will procure one of these handy reference booklets.



By CHARLES SEIVERS

IN this issue is shown a flaring article round in plan at top and bottom but with one side in elevation square with ends, as shown by A-C-D in elevation.

The first step is to draw plan with two circles, divide both circles in plan into the same number of equal parts as shown by 1-2-3-4 etc. and A-B-C-D etc., in dividing the two circles start at the end of diameter on inner circle which is parallel diameter on outer circle. Then draw lines joining these divisions as shown by 1-A-2-B-3-C-4-D-5-E, etc., and with these distances as bases and with straight height of elevation at A-C as an altitude form the angles shown at L-M-N-O.

The pattern could not be laid off with angles derived from lines as above described as it is necessary to form another set of angles, the base lines of these are drawn so as to join the ends of two adjoining lines drawn from division points, as shown by dotted lines joining 9-H, 8-G, 7-E, 6-E, 5-D, 4-C, 3-B, and 2-A.

With these lines as bases and same altitude as described above, from angles as shown at R-S-T-V and X. To lay out pattern 1-A making it equal to A-C on elevation, this gives us points 1 and A shown on plan.

To obtain the next point on either top or bottom of pattern it is necessary to work from 1 to B as a base on plan or from A to 2, as shown in the connecting or dotted line from A to 2

Now take distance R-2 and angle formed with A-2 as a base line, and with point, A in pattern as a centre, draw an arc near point 1, with one division of plan of base as a radius, as 1-2; then draw an arc from point 1 on pattern intersecting one drawn from A, thus obtaining point 2; this gives us points 1 and 2, and A. To obtain the next point B, take distance L-B formed with base line 2-B, and using last obtained point 2 as a centre and draw an arc near point A intersecting it with one drawn from A, having a radius equal to one division of plan of top, as A-B, lay out all the remaining angles working as described from B to 3 on dotted line, B to C on solid line, C to 4 on dotted line, 4 to D on solid line until the line 9-K or one half the pattern is set off, when a line drawn through the points obtained will give outline of one half pattern which can be used to mark off balance, or the above can be laid on opposite side of line A-1 as shown as suits one's purpose.

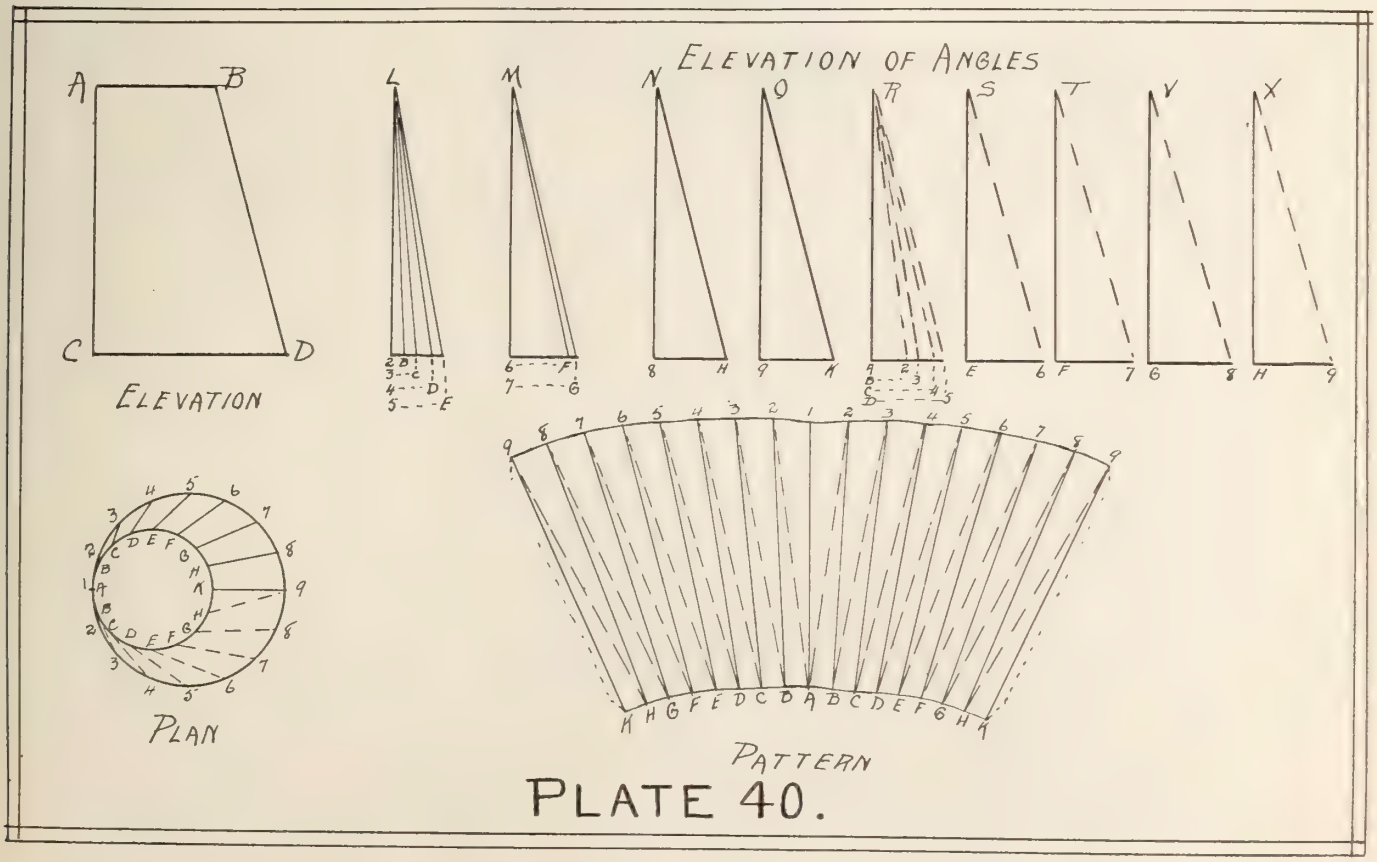


PLATE 40.

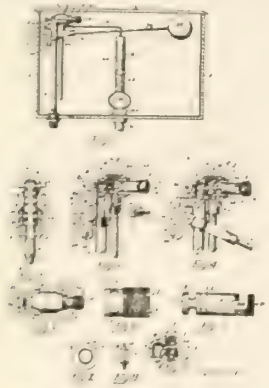
New Canadian Patents

No. 165,078

The B. O. T. Manufacturing Company, Limited, Toronto, Ontario, Canada, assignee of Tilghman J. Florey, Washington, New Jersey, U.S.A., 28th September, 1915; 6 years. Filed 15th May, 1915. Receipt No. 251,795.

Claim.—1. A ball cock for flush tanks, including a body mounted above the highest level of the water in the flush tank, said body provided with inlet and outlet chambers connected by a port, a plunger valve reciprocatable in said body for opening and closing said port, a link for operating said plunger valve, a rocking lever for actuating said link, a yoke for rocking said lever, and a float for operating said yoke.

2. A water inlet valve for flush tanks, including a body having inlet and outlet chambers connected by a port, a bushing disposed in the outlet chamber concentric to said port, a plunger in said bushing movable towards and from said port, a link for reciprocating said plunger, a collar for holding said link in



No. 165,078. Ball Cock.

place, a float, and a rocking lever connecting said link with said float.

3. A ball cock, including a body having inlet and outlet chambers connected by a port, a bushing telescoping said body concentric to said port, a plunger telescoping said bushing, the inner end of said plunger having a valve head for closing said port, the outer end of said plunger being threaded and provided with an L-shaped slot, a rocking lever pivoted to said body, a link for reciprocating said plunger, one end of said link disposed in said slot, the opposite end of said link connected to said lever, a yoke pivoted to said body, a link connecting said yoke to said lever and forming the pivot of said yoke, and a float connected to and operating said yoke.

4. A ball cock having in combination a hollow body provided with an inlet and an outlet chamber connected by a port, a pipe for supplying water to the inlet chamber, a pipe for draining said outlet chamber, a valve seat disposed concentric to said port having a hub projecting into the outlet chamber, a cylindrical bushing screwed into said body concentric to and engaging said seat, a plunger reciprocatable in said bushing having at one end a valve disc for closing the passage through said seat, the opposite end of said plunger being threaded and having a notch, a rocking lever pivoted to said body, a link, one end of said link disposed in the notch in said plunger, the other end thereof connected to said rocking lever, and a nut for holding said link in said notch.

No. 165,032

Ira A. Mann, Pittsburg, Pennsylvania, U.S.A., 21st September, 1915; 6 years. Filed 7th May, 1915. Receipt No. 251,511.

Claim.—1. In combination, a wall bowl having an upwardly inclined outlet passage, upright piping in the wall, an inclined coupling lying in the said passage and connected with the said piping, a gasket between the wall of the inclined outlet passage and the exterior of the coupling, and means adjustable longitudinally of the coupling for compressing the gasket.

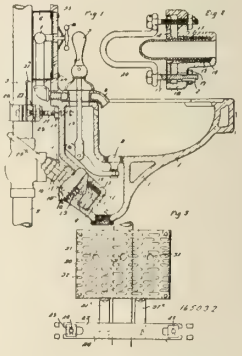
2. In combination, a wall bowl having an upwardly inclined outlet passage, upright piping in the wall, an inclined coupling lying in the said passage and connected with the said piping, a gasket between the wall of the inclined outlet passage and the exterior of the coupling, and a sleeve lying between the coupling and the wall of the outlet passage and adjustable longitudinally of the coupling and adapted to apply pressure to the said gasket.

3. In combination, a wall bowl having an upwardly inclined outlet passage, upright piping in the wall, an inclined coupling lying in the said passage and connected with the said piping and having a shoulder at its lower end, a gasket engaging said shoulder, a member surrounding the coupling and engaging the gasket, and means for adjusting the said member downward to compress the gasket.

4. In combination, a wall bowl having an upwardly inclined outlet passage, upright piping in the wall, an inclined coupling lying in the said passage and connected with the said piping, a gasket between the wall of the inclined outlet passage adjacent the lower end thereof, a member fitting slidably around the coupling and engaging the gasket, and means for moving the member down to compress the gasket.

5. In combination, a wall bowl having an upwardly inclined outlet passage, upright piping in the wall, an inclined coupling lying in the said passage and connected with the said piping, a yoke fitting around the piping, screw connections between the yoke and bowl, a gasket between the wall of the outlet passage and the coupling, a member fitting slidably around the coupling and engaging the gasket, and means whereby the said member is moved along the coupling by the said screw connections.

6. In combination, a wall bowl having an upwardly inclined outlet passage, upright piping in the wall, an inclined coupling lying in the said passage and connected with the said piping, a yoke fitting around the piping, a gasket between the wall of the outlet passage and

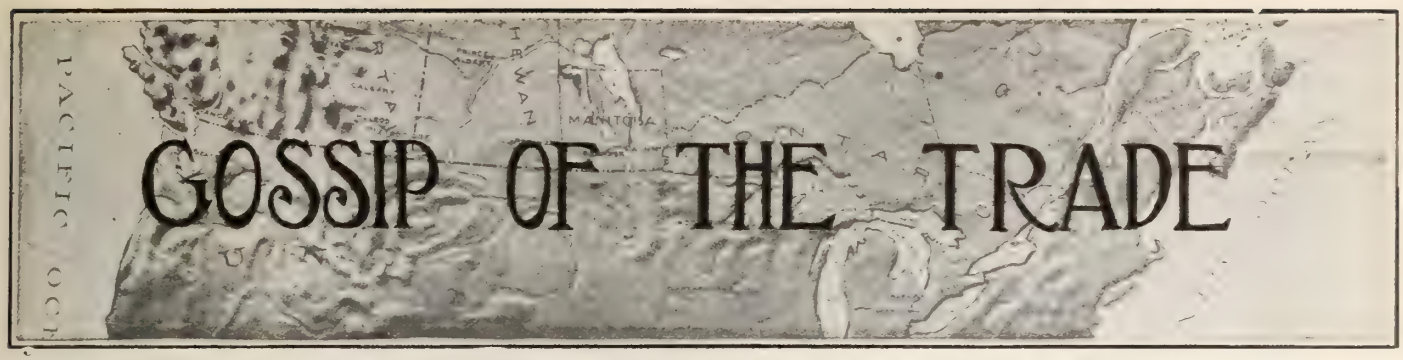


165,032. Plumbing Bowl.

the coupling, a member fitting slidably around the coupling and engaging the gasket, threaded connections extending from the yoke through the said member, and means for securing the threaded connections to the bowl and for adjusting the said member longitudinally of the coupling to compress the gasket.

7. In combination, a wall bowl having an upwardly inclined outlet passage, upright piping in the wall, an inclined coupling lying in the said passage and connected with the said piping, a yoke fitting around the piping, a gasket between the wall of the outlet passage and the coupling, a member fitting slidably around the coupling and engaging the gasket, threaded connections extending from the yoke through the said member and through portions of the bowl, nuts

(Continued on page 30.)



NEW BY-LAWS UNDER CONSIDERATION

The Montreal Plumbers' Association at its last meeting discussed the new city building by-laws which, owing to their efforts during the past year are now to be kept separate from the plumbing by-laws.

SEPARATE BY-LAW FOR MONTREAL

The Montreal Plumbers' Association after a year of effort have succeeded in inducing the Montreal city authorities to separate the city plumbing by-laws from the building by-laws.

NEW APPOINTMENT

The friends in Canada of Professor Arthur Bateman, formerly the director of the Anglo-American Sanitary Correspondence College, will be pleased to note that he has been appointed director of the Sanitary Engineering Department at the American School of Correspondence, Chicago. Mr. Bateman is heart and soul a practical sanitary and heating engineer, and has previously filled a number of very prominent positions in sanitary science schools. Readers of The Sanitary Engineer have many times read articles of value from his pen, and will again enjoy that privilege from time to time in the future.

ENLISTS FOR SERVICE OVERSEAS

Another Winnipeg inspector has responded to his Country's Call. E. J. Samson of the plumbing inspection dept.

Brother Samson was born in London, England, year 1881. Learned the plumbing trade in London. Was with the Imperial Forces throughout the South African War, for which he carries the Queen's Medal and five clasps. Came to Winnipeg in 1903, working as journeyman and foreman plumber for seven years, and was then employed by the City of Winnipeg as Assistant Plumbing Inspector for six years. For last two years was Inspector of Plumbing at St. Johns' Technical School evening classes. He is also a live member of the Canadian Institute of Sanitary Engineers. Joined the 203rd Battalion C.E.F. on February 19th, 1916, as private. At end of one week was promoted to the rank of Sergeant, which position he held for three weeks when he was again promoted to the rank of Sergeant Major, which position he now fills with bright prospects of further promotion in the near future.

E. T. SAMSON
Winnipeg, formerly Assistant Plumbing Inspector in that City.

SARNIA TO BUILD UP-TO-DATE SCHOOL

Sarnia is to spend $58,000 on a new school. It is to be fitted up in the most modern manner, with Vento indirect heating as well as air washers. Direct heating, solid porcelain fixtures and high grade brass goods are to be used. Drinking fountains will also be installed. From reports received it is to be one of the most up-to-date fitted up schools in Canada.

ALLIED AVIATORS CONTROL THE AIR

Among the many glimpses of the stern business of war to be given at the Canadian National Exhibition will be stirring exhibitions by intrepid airmen who will demonstrate the heroic nature of the calling of their comrades above the war swept trenches in Flanders. They will run the gauntlet of hostile fire from batteries and anti-aircraft guns, meanwhile making observations as they manoeuvre with a seeming indifference to danger in an effort to drop their own explosives on the warship in Exhibition harbor and on the batteries firing from shore.

MAIN SEWER MAY HAVE TO STAND UNTIL AFTER THE WAR

At a special meeting held recently the city council of Stratford, voted against importing foreign labor to construct the new main sewer. The Board of Works urged the necessity of proceeding with the work at once from a sanitary standpoint, but the majority of the aldermen declared in favor of keeping their promise to the ratepayers that the work would be done by city labor. As this is not available the sewer will likely have to stand over until the war ends. The stand taken by the city fathers deserves credit from one point of view, but the vital question is, "Are the lives of Stratford's citizens being endangered by the delay?" The Sanitary Engineer is of the opinion that whether the council keeps faith with the people, or not, this matter should be decided by the board of health.

If the holding of the work over until after the war means the loss of one life or endangering the general health of the people of Stratford, then by all means the work should be done at once.

Stratford to-day holds the reputation of being one of the cleanest and healthiest cities in Canada, therefore, no hair-splitting methods should be tolerated.

Cleanest City in Province

"The cleanest city I know of in the Province." Such is the verdict of Dr. Adam Wright, chairman of the Provincial Board of Health. Dr. Wright has been in the city as the guest of Dr. J. A. Robertson, M. H. O., and his opinion is based upon what he has seen during that time.

"The general methods as regards watching the city are as good as any I know," he continued. "The inspector or inspectors are doing their work remarkably well. I have paid three or four visits to the city and I have al-

A number of the Toronto-Buffalo members who met on pleasure bent at Edgewater on June 27th.

ways been impressed with the success of the health officers in Stratford."

It might be interesting to sanitary engineers to know that Stratford has one of the simplest, and most practical plumbing by-laws in operation in Canada. The powers that be employ a practical plumbing inspector in spite of the fact that the population is only a matter of 16,000.

It seems little short of a crime to allow carpenters, building inspectors, architects and the like to be appointed head of the plumbing inspection, as is the case with many of our important towns and cities.

TAKEN LIFE PARTNER

Geo. Trickey, Toronto, one of the newly elected members of the Toronto society of Domestic Sanitary and Heating Engineers, took on a new partner for life on July 12, Miss Isabella Brown of Medford being the lady. Mr. and Mrs. Trickey left the city to spend their honeymoon at New York and Buffalo. The bridegroom was recently in partnership with the congenial Frank W. Clifton heating engineer for over 3 years, but evidently he was of the opinion that one partner at once is

ANNUAL PICNIC

The Toronto Society of Domestic Sanitary and Heating Engineers will hold their annual picnic on Tuesday, Aug. 1st, at Island Park, 2 p.m. sharp. A splendid programme has been prepared and a big crowd is expected. Among the events will be the fat man's and fat women's race, base ball, with no hay seed balls such as were handed out at Springbank Park, London.

Referring to this latter item about hayseed balls. Some of the members have been wondering whether some arrangements had not been previously made with Bro. Gibbons, London to reseed the park by furnishing these hayseed baseballs. It's up to Bro. Gibbons to clear up the mystery. At the same time it would look like making work and pleasure go together, if this new method of seeding is to be adopted by the Springbank Park authorities. Compliments would not be out of place if such is the case.

CONGRATULATIONS

On July 6th, the wife of F. W. Clifton presented him with a fine son. Both mother and child are doing well and a great future is being planned by the proud parents for their big bouncing boy. The Sanitary Engineer joins with their friends in wishing the "Cliftons" all they wish themselves.

Toronto-Buffalo Annual Picnic

Ideal Day, Ideal Crowd and Ideal Reception—One of the Most Enjoyable Picnics in the History of the Two Societies

BRIGHT and early on Tuesday, June 27th, over 120 members of the Toronto sanitary and heating engineers, wives and families stepped on to the deck of the good ship "Cayuga" in response to a hearty invitation from the Buffalo society of sanitary and heating engineers.

This society held their annual picnic at Edgewater on the Grand Island, which is situated about 15 miles away from Buffalo and several weeks ago made arrangements to give the Toronto bunch "the time of their life" and they did. The day was ideal, and the S.S. Cayuga made a splendid trip across the lake to Lewiston. There the party disembarked to board electric cars, which travelled by the Gorge Route to Niagara Falls. Here the party changed cars and travelled through the principal streets of Niagara Falls and on to Edgewater about 10 miles away.

The party here stepped aboard a steamer and across the Niagara River to the Grand Island.

Those Buffalo Boys certainly know how to receive their guests.

A brass band escorted the Toronto's all round the picnic grounds, and back to a house boat, upon which a splendid repast was served, and judging by the way the Canucks tackled that repast one would have thought they had been fasting through a double sized lenten season. Music was served too by the tender sex, the sons being from as far away as "My Old Kentucky Home" to "Old Tipperary of a Long Way Off", more than one of the Toronto boys, whose early days began in the land of the thistle, remarked that it reminded them "O bein doon the watter for a wee spree ye ken".

The next item on the programme were games of all kinds, prizes being awarded. The ladies of both parties, sawed wood and in many ways showed the male element that they could do their

bit. In some way or other there must have been some grafting going on, because the Toronto visitors were awarded nearly all the prizes. Base ball of course was the main feature and a good game it was. Shop talk was strictly forbidden the only thing which had a tendency to remind one of shop being a solderless, water proof solid lead float, the usual size but only about 45 lbs. weight. Trying to cast that float more than 10 feet was almost as hard as trying to cast off one's sins. It simply would not let go.

After the games were over another fine repast was served and the visitors from Toronto started on their first stage back for home. A splendid ride in the cool air both by car and boat brought the day to a close and all agreed that the Buffalo boys certainly are right royal entertainers.

BALL TEAMS

Buffalo

Lith, ss.	1
Kriess, 2nd base	1
Radia, pitcher	0
MacGammell, catcher	1
Keller, 1st base	0
Rogers, 3rd base	0
Clucas, r. field	0
Heber, l. field	0
Smith, c. field	0

Score 3 runs.

Toronto

Ramsey, 2nd base	0
Mansell, r. field	1
Menzie, 1st base	0
Abbott, l. field	0
Wright, s.s.	0
E. Byrnes, catcher	0
Swanston, 3rd base	0
Cracknell, centre field	0
Roy Byrnes, pitcher	1

Score 2 runs.

JUST PASSED ON

A host of friends in St. John, N.B., and throughout the province, will hear with sorrow of the passing away of James H. Doody, recently at his residence, 17 Pagan place. For the past two years Mr. Doody has been in poor health. Of late his condition was such that his family became alarmed and special treatment was secured but to no avail.

The late Mr. Doody was one of the best known citizens of St. John. A native of this city, the son of the late John Doody, he had lived here during his entire life and had carried on a sanitary and heating engineering business which had attained large proportions. For the past five years Mr. Doody had been retired from the business which is carried on by his son, J. H. Doody, jr.

Mr. Doody has been identified with many business ventures in St. John. He was an active member of the Board of Trade and was a member of the delegation from the local board that visited the West Indies in the interests of trade with this port. Mr. Doody was also president of the Canada Brush Company, a director of the St. John Ice Company, and of the Dufferin Hotel. He is survived by his wife, four sons and one daughter.

COUNTING THE COST

The Town Council of Thorold are not quite sure what step to take re enforcing a certain by-law in existence in their town.

The following extract from the "Thorold Post" will be very interesting:—

"The by-law for the abolition of outdoor closets where sewers exist was introduced and passed; dry-earth closets being allowed if properly cared for under certain conditions."

Mr. Grenville was not so sure about this by-law. Sanitary closets are now very expensive, and many people might suffer hardship if this by-law were passed and rigidly enforced.

The solicitor said the Provincial Board of Health could refuse approval of any sewer if this by-law were not passed.

As the mayor declared the by-law passed, he remarked, "If it is not pushed more than some of our by-laws it will not hurt anyone."

Mr. Grenville is of the opinion that sanitary closets are very expensive. But he evidently does not know that no sanitary closets cost more, that insanitary closets cost still more.

That life is far more precious than pelf. Of course we agree with Mr. Grenville that it is far easier to die than live, so long as the death is painless.

The mayor self-admits his own incompetency as mayor when he remarks that "If it is not pushed more than some of our by-laws, it will not hurt anyone."

The real facts may not be as rosy as the mayor thinks if some epidemic were to visit the town. Who would be to blame?

No civic official is supposed to enforce existing by-laws of a town as is the mayor, and the time may not be far off when somebody is hurt, by not being called upon to carry out their health by-laws.—Editor.

EVERY WOMAN HER OWN PLUMBER

Almost every day now someone comes forward with a suggestion as to how women may learn to do things which will save expense and at the same time free a man to do work which they can't possibly do. The latest practical hint comes from Miss Davidson of the Technical School, who thinks that women might very well learn how to keep the above ground plumbing in their house in repair. She also suggests that women who need to make a living, fit themselves for this sort of employment.

What Woman Ought to Know

There are classes in plumbing at the Technical school, and very simple and practical instruction is given in an art which Miss Davidson declares is not at all beyond the reach of the average woman's skill.

"Where's the woman who couldn't put a washer on a tap if she only thought she could?" asks Miss Davidson, a spice of scorn lurking in her voice and all ready to descend upon the luckless wight who might attempt to prove woman's incapacity in the plumber's sphere.

Miss Davidson doesn't claim her idea as original, but says it is the outcome of several telephone messages from housewives who had failed to secure a plumber to rescue them from plumbing troubles, and had in desperation evolved the slogan "Every woman her own plumber."

A Practical Illustration

"You know the idea of including a working knowledge of tools supposed to be entirely masculine in a course of household economics, met with many scoffs at first," says Miss Davidson. I remember so well one man who thought the whole thing the utmost flight of folly, and said so. But a few months after he had been jeering at its outlandishness he called me up.

"'I want to tell you,' he said, 'that I wish that girl of mine had learnt something about plumbing when she was at the school. The other night her mother and I went out and she called up to say that one of the taps was running. So I told her to turn the water off and it would be all right. Presently she called again to say she had turned the water off, but it was still running, and it looked like a flood.

A $500 Flood

"'Like a flood? There was a five-hundred-dollar flood by the time her mother and I got home. Do you know that girl hadn't the faintest idea that there was such a thing as a tap in the cellar, and that was the one I meant? You go right ahead, Miss Davidson—teach 'em all the plumbing you can get into 'em.'"

"Which, was encouraging from an anti, wasn't it?" adds Miss Davidson, as she concluded her story.

It will be remembered that more than a year ago Miss Knox of Havergal urged the girls who were going out from her school to learn the ways of hammers and saws, monkey-wrenches and screwdrivers, so that damanged door handles and crusty window sashes need not be left to the ministrations of a highly-paid official person, such as a carpenter or an expert steamfitter.

BRIDE BRODER, in Toronto Globe.

Tale of a Plumber's Victim

Dear Bride Broder: He (he was a plumber) got on a Church car, corner of King. He got off at the corner of Huntley, and in three minutes was in my home. He went to the cellar, cut off the water, and then put a washer on a tap in the bathroom and was out of the house in fifteen minutes. I allowed twenty minutes each, coming and going, and twenty minutes in the house—one hour in all, expecting a bill for $1 or less. It was $2.75. Sinking the Merrimac in the face of Spanish batteries required nerve, but think of the nerve required to make out a bill for $2.75 for a washer and less than an hour's time.

Suppose this plumber had been asked to charge at Saloniki, the hearts of the Turks would have gone clear down into their boots. When this plumber charges everybody has to go down into his socks.

To be hit in the back of the neck with such a charge as this was getting to my haughty pride and disarranged my collar button.

Experiences of this kind have their compensations. Every member of my household, including the cook, can now put on a washer.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

WHO MANUFACTURES AIR LIFT PUMPS?

Editor The Sanitary Engineer. Some time ago you described an air lift water system pump of some kind or other in The Sanitary Engineer.

I have mislaid the copy in which the item appeared. Will you please furnish me with the names of any manufacturers who make this type of water system?

The Milwaukee Air Power Pump Co., 832 Third St. Milwaukee, Wis.

The United Pump & Power Co., Milwaukee, Wis.

WHAT SIZE SEPTIC TANK?

Editor, The Sanitary Engineer.

We expect to instal the following fixtures in a factory now being built in our city. About 100 men will be employed. There are to be installed 11 w.c.'s and 2 large wash sinks. We would like to know where we can procure cast iron syphons, two-piece syphons, and the size of septic tank required; also the number of feet of tile pipe required for such an installation? B. B. P.

The size of syphon should be arrived at by the following particulars:

Allow 15 gallons per day per person, providing no other waste water than simply w.c. waste and washing water is flushed into the system.

The tank should be of two compartments—a receiving chamber and a dosing chamber, the latter to be the one to be calculated upon. The receiving chamber can be, if desired, 25 per cent. larger by making it deeper. The cubic contents must be arrived at by the amount of sewage which will be discharged at each flush of the syphon. We would advise the use of a 5-inch syphon at least. The amount of tile pipe required would be 12 to 15 lineal feet of 4-in. pipe to every cubic foot of sewage to be discharged.

The formula, 0.75 gallons per person is allowed, the dosing chamber from the high water level to low water level would have to contain 214 cubic feet. This would require from 2,782 to 3,210 lineal feet of 4-inch pipe.

The main trunk pipes should not be counted in. These joints must be tight. The field tile must not be placed less than 4 feet apart, and the depth no more than 12 or 14 inches. Any jobbing house will furnish these syphons. The manufacturers are Anthes Foundry Co., Toronto; West Toronto Foundry Co., West Toronto; Stevenson & Malcolm Co., Guelph.—Editor.

COIL IN FURNACE QUESTION

Editor, The Sanitary Engineer.

I have a customer that owns quite a number of nice residences, and in each house a coil was fitted in the fire box of the furnace to furnish hot water for domestic purposes. Last winter two of these coils burned out, and in one case it happened while the tenant was out and did considerable damage.

I advised my customer that these coils were not what they are cracked up to be, and certainly do not save coal. He disagreed with me, and said he was under the impression that the water was heated at no cost, if these coils are so placed.

What is your opinion? Do you think heating water by a good gas water heater is as cheap? H. W. C.

As far as economy goes, there is no economy practised when such a heater is installed in a furnace. It may to some extent be convenient to have lots of hot water in winter, but any hot water procured by such medium of heating only reduces the capacity of the furnace and interferes with combustion of gases in the firebox when a large quantity of hot water is drawn off at once.

It would be far better for an owner to furnish a first-class gas water heater for a tenant than instal such a thing in the furnace. Moreover, under this plan you only get a winter hot water service, whereas with a gas water heater there would be an all-year-round service. Another point—if property-owners were educated to instal gas water heaters in new houses when built, sanitary engineers would more likely get the work of installing them.—Editor.

RURAL SANITATION

(Continued from page 15.)

the basket in place, and as the sewage flows through the paper caught by the meshes of the basket, much of the solid matter is retained necessitating the cleaning of the basket (two baskets should be provided for convenience when changing) about once a week.

In such a system more solids than usual get into the tile and Col. Waring therefore advised 4 in. or 6 in. absorption tiles with ½ in. open joints laid in coarse gravel or other open material just under the surface in two, or better three series, each of which has the full capacity of the tank.

"The discharge being at intervals of from 12 to 24 hours the liquid sewage with its soluble and finer suspended impurities will have ample time to leak out into the soil; and during the period of intermission, while the other two series of drains are being used, worms, beetles, and other insects will consume, or decomposition will destroy, the relatively small amount of deposited matter, which, however, might be sufficient to obstruct 2 in. tiles" is how Col. Waring describes this method of tile disposal.

(Continued in next issue)

The problem of civilization is to set each individual to do something useful, something worth while, and the ideal race will be evolved when each individual is set at work to do the thing he is best fitted and prepared to do.

The Goods You'll Eventually Buy Just Examine This Illustration

It is fuller in design, compression in action. Our Rapidac line is made up in several styles and designs.

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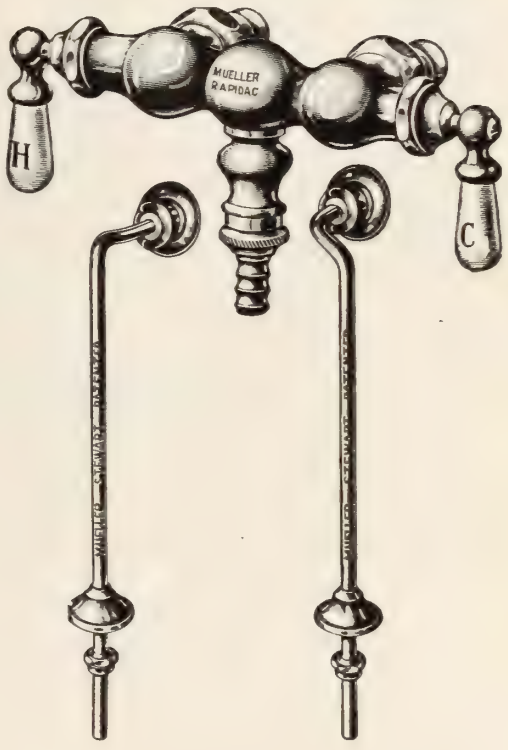
When asking a customer to buy, you always explain the splendid quality, the lasting service, etc., and finally you guarantee the goods. Which means you put quality first.

MUELLER *Rapidac*



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NO SUCCESSFUL BUSINESS was ever built up on price only. It is quality that counts. Our goods are big business builders. Let us help to build up your business.

Sold by all jobbers throughout the Dominion.

H. Mueller Manufacturing Co., Limited
SARNIA, ONTARIO

NEW CANADIAN PATENTS

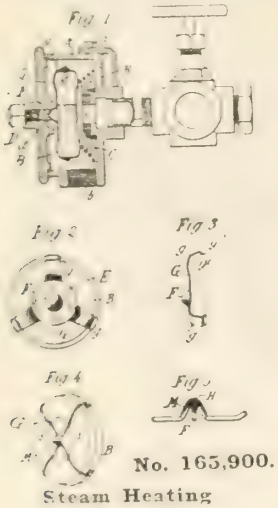
(Continued from page 24.)

on the threaded connections, and means for securing the nuts against rotation with respect to the threaded connections whereby such threaded connections may be rotated by the nuts and the said member adjusted longitudinally of the coupling to tighten the gasket.

No. 165,900.

The Canadian Gold Car Heating & Lighting Company, Limited, Montreal, Quebec, Canada, assignee of Edward Ethel Gold, New York City, New York, U.S.A., 9th November, 1915, 6 years. Filed 5th August, 1915. Receipt No. 254,712.

Claim.—1. A retaining device for a thermostatic cell, comprising a plate, arms on said plate having bent spring



No. 165,900.
Steam Heating Apparatus.

ends adapted to engage over the side of the cell and hold the plate in place, and an outwardly projecting boss on said plate.

2. A retaining device for a thermostatic cell comprising a plate, spring arms on said plate adapted to engage over the side of the cell and hold the plate in place, and said plate being detachable from said cell, and an outwardly projecting boss on said plate.

3. A retaining device for a thermostatic cell, comprising a plate, outwardly projecting arms integral with said plate and having bent ends adapted to spring over the side of the cell and hold the plate in place and being detachable therefrom, and an outwardly projecting boss on said plate.

4. A retaining device for a thermostatic cell comprising a plate, arms on said plate having bent ends the extremities of which are shouldered and are adapted to clasp the sides of said cell and hold the plate therein by reason of said shoulders passing over the seam in the cell, and said cell being removable from said arms, and an outwardly projecting boss on said plate.

5. A retaining device for a thermostatic cell comprising a plate, arms on said plate having bent ends the extremities of which are shouldered and are adapted to clasp the sides of said cell and hold the plate therein by reason of said shoulders passing over the seam in the cell, and an outwardly projecting boss on said plate, said plate and arms being integral and formed of spring metal.

6. A retaining device for a thermostatic cell comprising a plate, arms on said plate having bent ends, which are adapted to clasp the sides of said cell, the said ends being shouldered and adapted to hold the plate in position by engaging the seam in the side of the cell, and said bent portions being turned outwardly at their ends whereby the assembling of the device is facilitated, and said plate having an outwardly projecting boss, and said arms, plate and boss being integral and formed of spring metal.

7. A portable retaining device for a thermostatic cell formed of spring metal having an outwardly projecting boss, and said device provided with spring arms having hooks which are adapted to spring over and clasp the sides of a cell and to be readily detached therefrom.

MONTREAL'S NEW FILTER PLANT

Will Supply About 60,000,000 Gallons Per Day

With the completion of the filteration plant by December 1, which seems fairly probable, the city of Montreal will have a supply of pure filtered water sufficient for four or five years to come, at the end of which time the question of enlarging the new plant will be dealt with. Although the estimated capacity was 50,000,000 gallons a day, it will in reality surpass that figure by about 10,000,000 gallons. The latter quantity of water should supply Montreal for a few years yet, it is thought, and even if it were occassionally surpassed, the city could always make use of the mechanical system now in use. For that reason the heavy expense of constructing another filter at the present time, will be avoided.

During the hot spell last summer the 50,000,000 gallon mark was passed several times, and during one of the visits of Herring and Fuller, the New York consulting engineers, they recommended that plans be prepared for another filter of 50,000,000 capacity, and in fact, the plans are being got ready leisurely by the city engineers.

FOR SALE

TWO HORSE POWER ELECTRIC MOTOR and Pipe Cutter and Threader for sale at bargain price. Apply Box 840, Preston, Ont.

PURO
SANITARY

Drinking Fountains

WILL PROVE A PROFITABLE LINE TO HANDLE

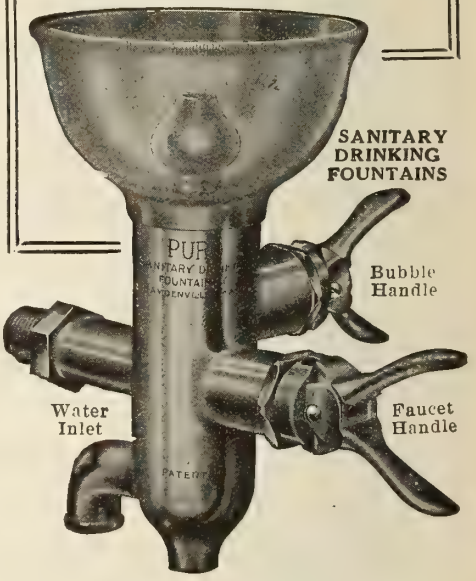
BECAUSE

The "Safety First" movement, which is becoming more popular every day, is particularly forcible where the conservation of the Public Health through pure drinking water is concerned. The old-fashioned, disease-laden public drinking cup will soon be but a memory in thousands of plants, offices, shops, public parks, schools, etc.

Herein lies the opportunity of the live Sanitary Engineer to materially add to his business by getting after those institutions and supplying them with the "Puro," the most economical and sanitary drinking fountain on the market.

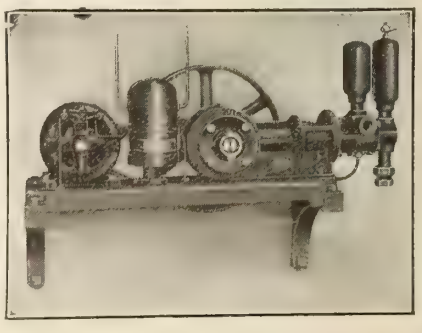
The Puro Sanitary Drinking Fountain will recommend itself because of its simplicity of attachment, and its automatic control.

Write to-day and let us show you how to make a handsome profit, not only on the sale, but also on the installation of the "Puro."



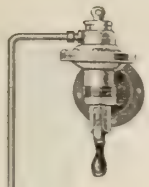
Puro Sanitary Drinking Fountain Company
147 University Ave., Toronto, Canada

The Paul Electric Motor Pump



Every plumber and jobber should write to the Fort Wayne Engineering & Mfg. Co. (Dept. S), Fort Wayne, Indiana, and ask for Bulletin 4973, which describes this popular pump for residence service.

The Distant Control



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Distant Control System

gives control of the water heater from any part of the house.

It is an attachment (supplied with the Stack Heater) that enables you to light the gas from your kitchen or bathroom or bedroom, even if the heater is located in the basement. If you are downstairs (at the heater) and want hot water for the laundry or any household purpose, turn on the control at that point, and the heater is instantly in operation.

IT FILLS A LONG-FELT WANT FOR A LOW-PRICED AUTOMATIC CONTROL AND FOR THIS REASON IT WILL BE IN BIG DEMAND.

Stack Water Heaters

Are guaranteed to produce more hot water for a given quantity of gas, and to last longer than any other copper coil heater of equal capacity made.

Drop a line for full details.

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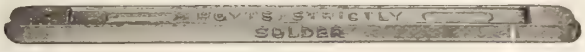

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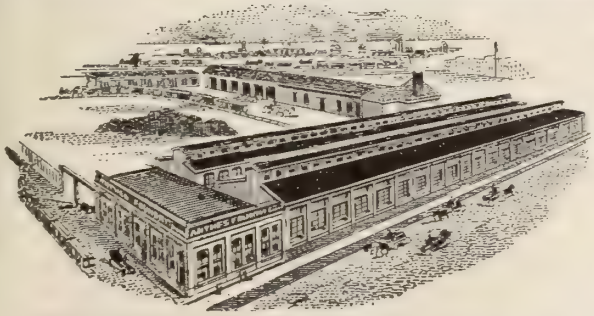

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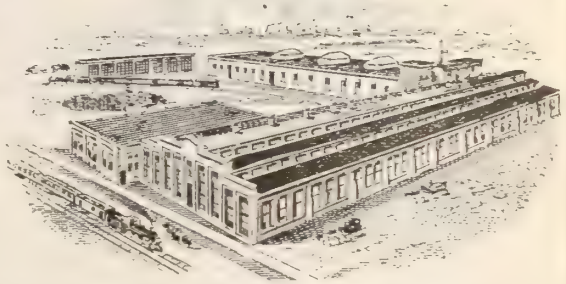

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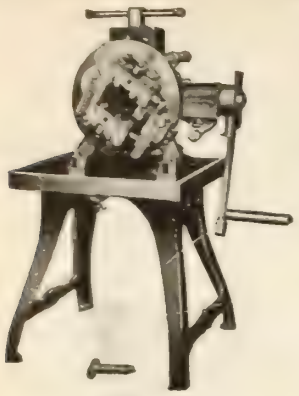

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This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
A time and labor saving machine.

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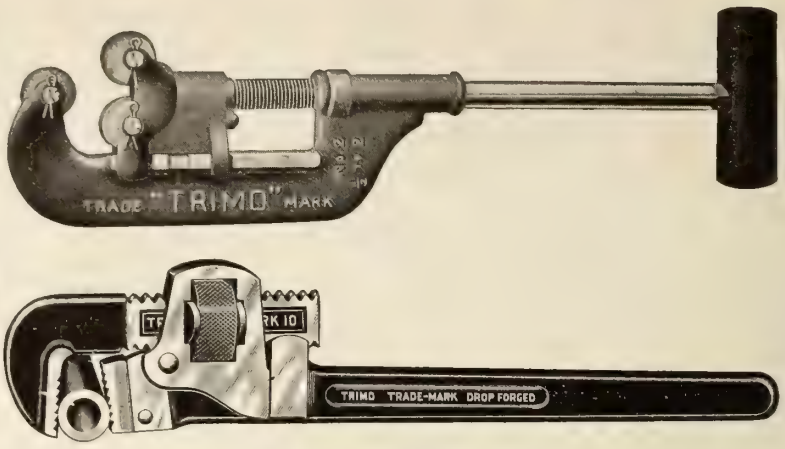

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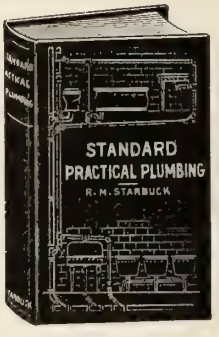
Water Supply, Sewerage, Sewage Disposal of Cities, Villages and Institutions.



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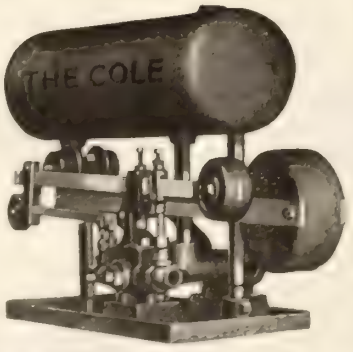

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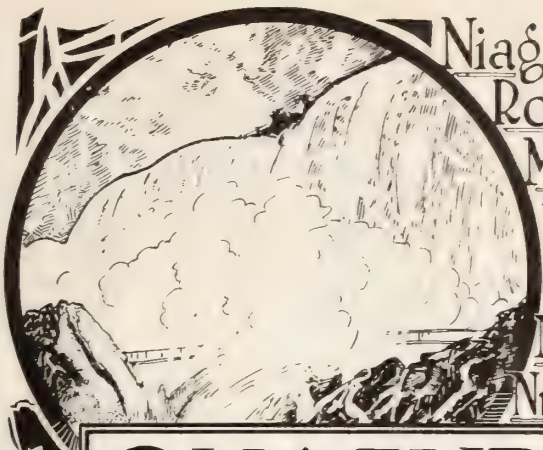

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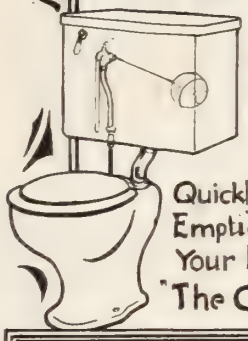

Neither do they Sing nor Whistle: but Quietly and Quickly Fill the Closet tank as oft as Emptied. Ask Your Jobber to fit Your New Tanks this Year with "The Quaturn Silent Ball Cock".

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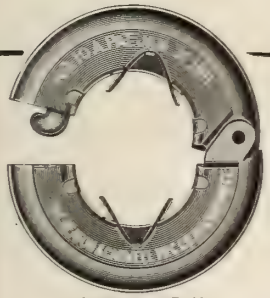

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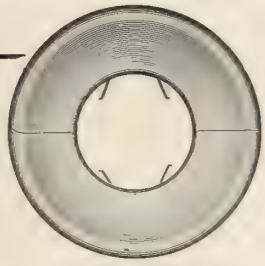

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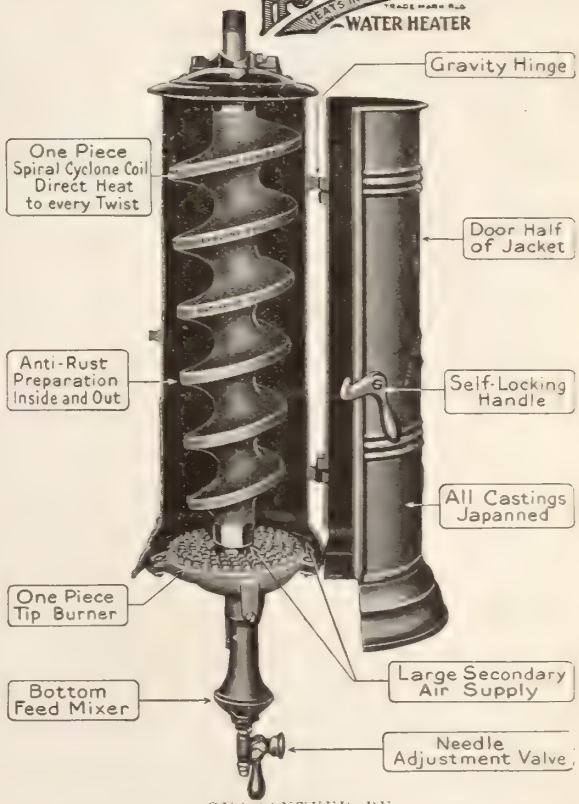
The Hotstream HEATS IN A HURRY TRADE MARK REG. WATER HEATER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Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

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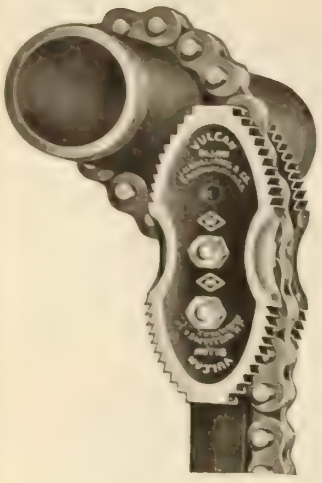

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We also manufacture NIPPLES in all sizes—black or galvanized.

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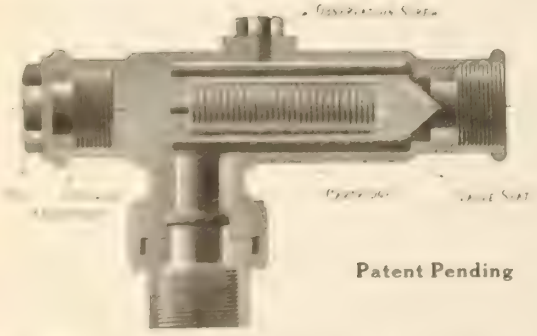

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make pipe-connecting work permanently trouble-proof

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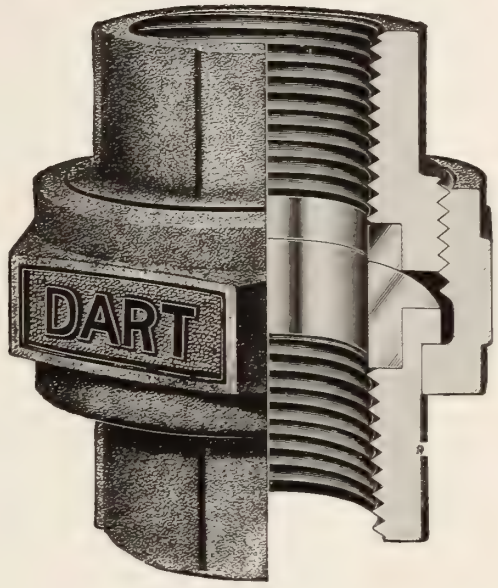

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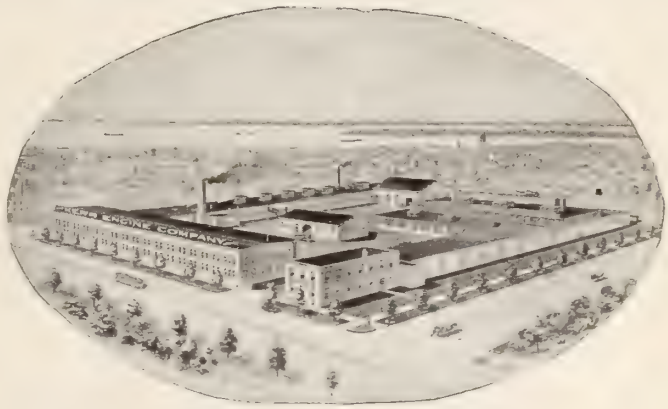

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We paid for the experiments long ago.

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WALKERVILLE, ONTARIO

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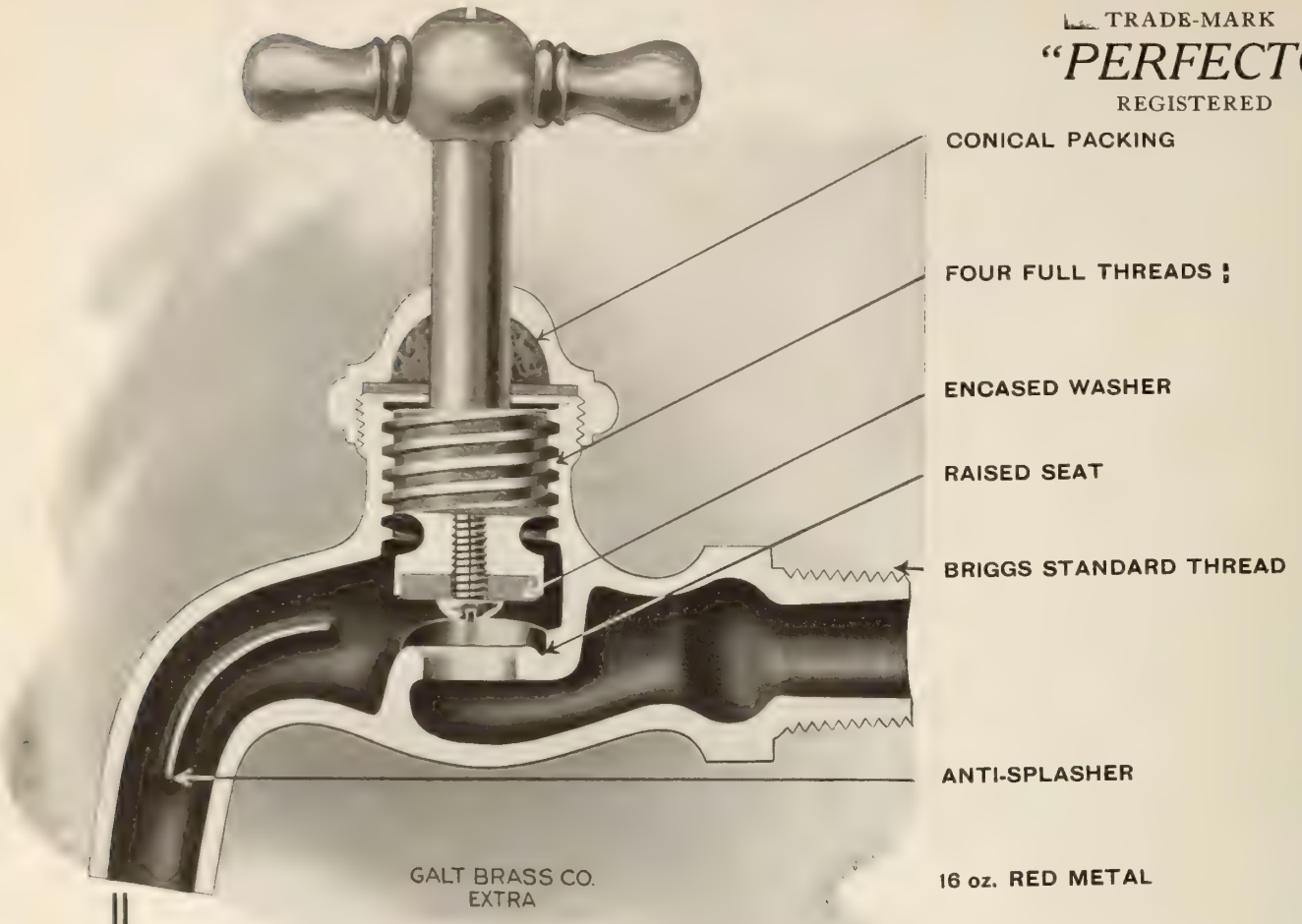

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Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. X | Publication Office: TORONTO, AUGUST 1, 1916 | No. 15

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with vitrous china side inlet wall closet bowl, shown here is specially adapted for Schools, Hospitals, and all other Public Buildings. They are sanitary, durable and noiseless in operation. We supply this valve in many different styles to suit all requirements.

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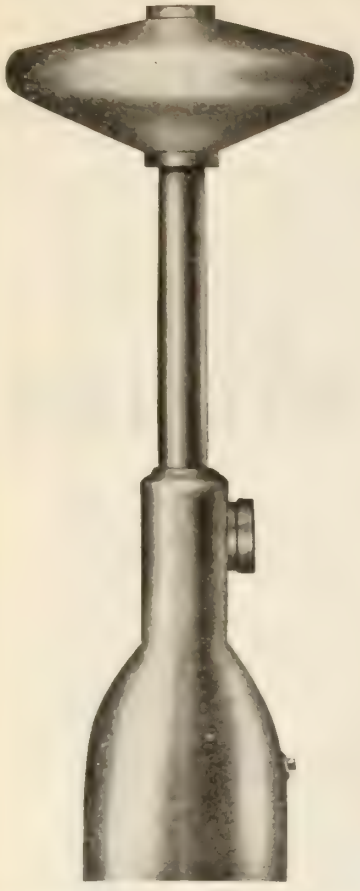

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Orders for all sizes of the Honeywell Heat Generator can now be placed with your Jobber or Boiler Manufacturer and they will be promptly supplied.

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The Honeywell Heating Specialty Co.

WABASH, INDIANA

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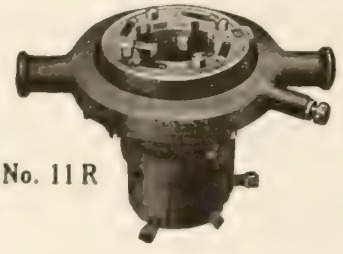

No. 11 R

"Jardine" Adjustable Ratchet-Threading Tool

Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely enclosed, excluding chips and dirt.

YOU CAN REDUCE THE LABOR OF PIPE THREADING 50 PER CENT., AND MAKE THREADS AS CLEAN AND PERFECT AS IF CUT ON A LATHE WITH ONLY ONE CUT WITH

"Jardine" and "Toledo" Pipe-Threading Tools

"Jardine" or "Toledo" dies spare the muscle of the man who does the work, and save money for the man who pays the wages, as they enable one man to do the work of two and costs less for repairs. No cams or jimcracks to wear and get out of order. Cutters that cut, don't squeeze. Set of cutters for each size of pipe. Lead screw ensures perfect pitch and form of threads. Adjustable to all variations of fittings, very durable cutters.

All threads finished at one cut. One man does the work of two.

It will pay you to look well into the merits of the "Jardine" and "Toledo" before placing your next order for tools of this kind.

Write for catalog and full particulars.

We'll gladly supply the names if you wish to have a chat with users in your town.

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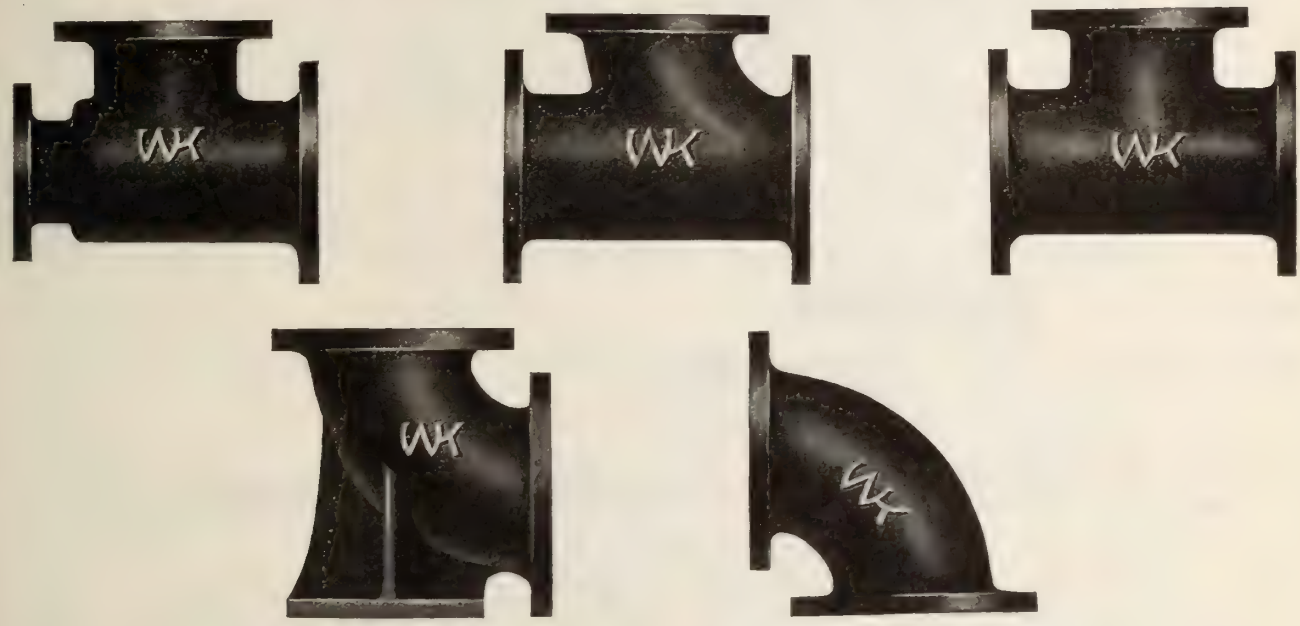

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Tank Heaters.

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Just a few months ago Mr. A. Livewire installed The DUNHAM VAPOR HEATING SYSTEM *for Mr. I. B. Uptodate, of Chilliville. Well, I. B. Uptodate had a good opportunity of testing it out during some changeable weather and he was more than pleased with results obtained. He says: "This system is the most flexible automatic system of heating I ever used. It takes but a short time after firing the boiler until you get heat all through the house. This, I imagine, is due to the Dunham Trap on the return end of the radiator which lets all the air and water of condensation pass, but holds back the steam. Then there are no air valves on the radiators like my old hot water system. Another great advantage is the fact of our being able to open the windows wide on a cold night and have no fear of frozen radiators in the morning.*

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Heating Contractors, get in on The DUNHAM VAPOR HEATING SYSTEM *superiority.*

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WE CAN ASSIST you to BOOST your business, BOOST your reputation as a reliable heating engineer, and at the same time BOOST your profits.
WE CAN and will furnish you with one of our Temperature BOOSTERS on 30 days' free trial.
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Agnes C. Laut

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Arthur E. McFarlane
L. M. Montgomery

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H. F. Gadsby

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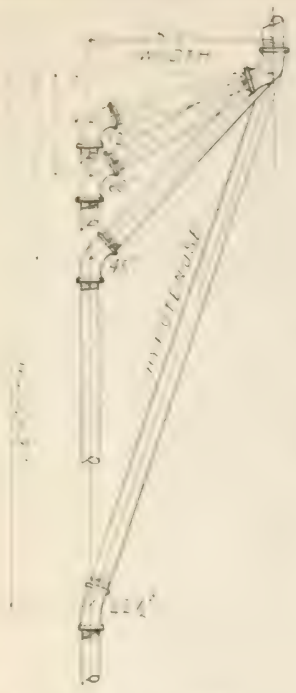

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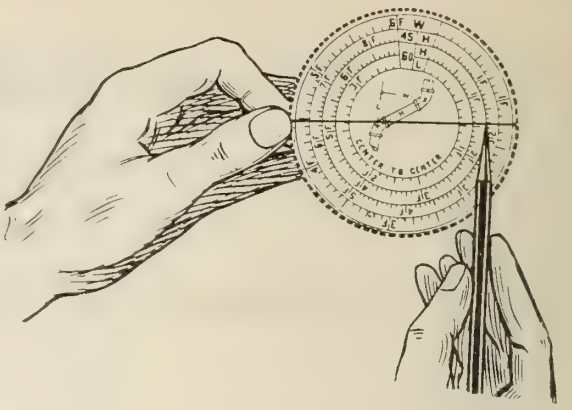

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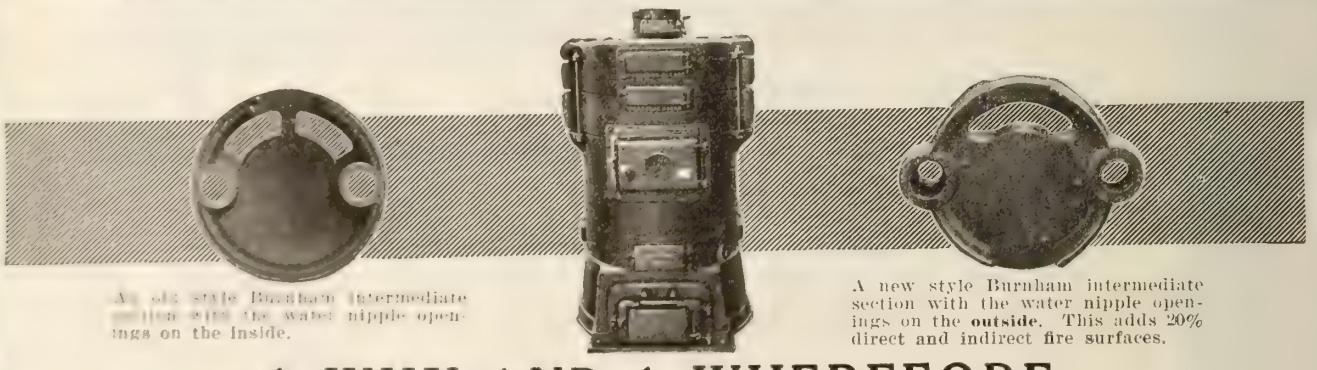

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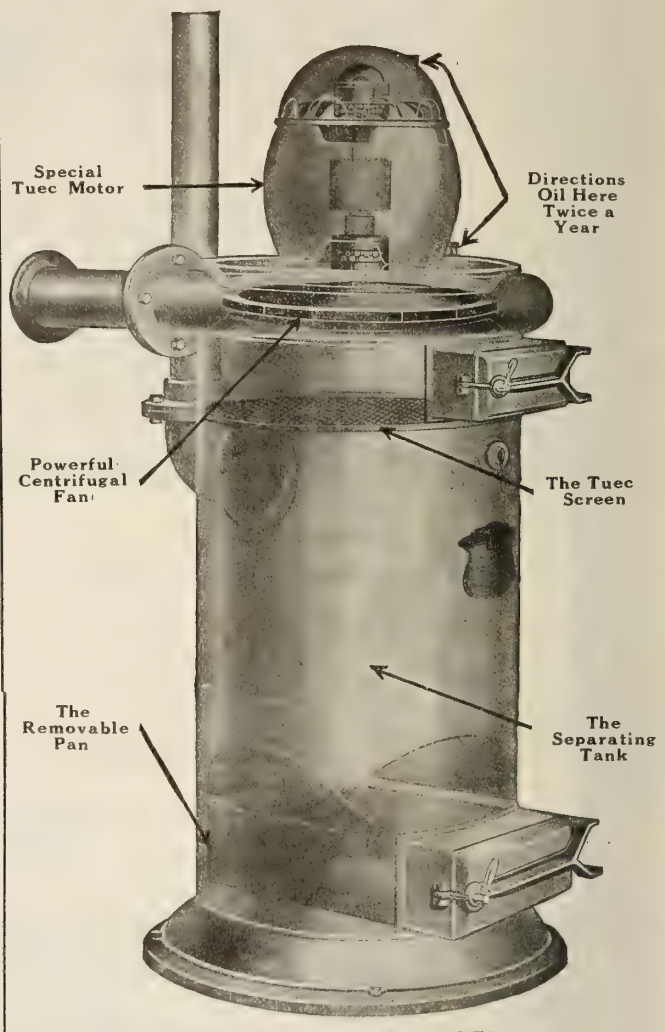

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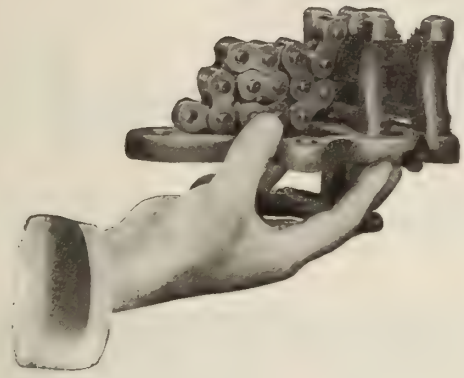

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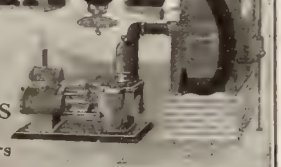

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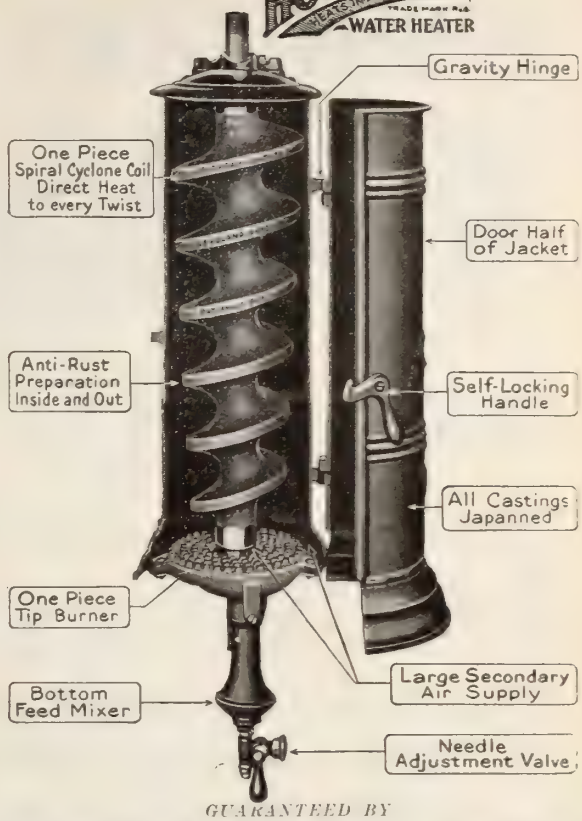
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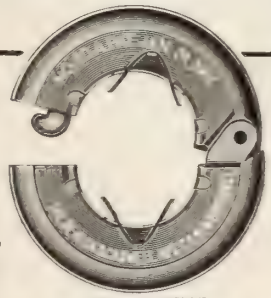

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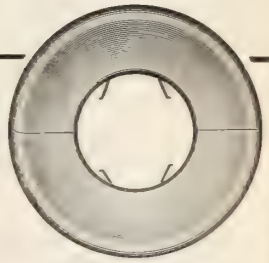

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SANITARY ENGINEER

PLUMBER AND STEAMFITTER OF CANADA

Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, AUGUST 1, 1916 No. 15

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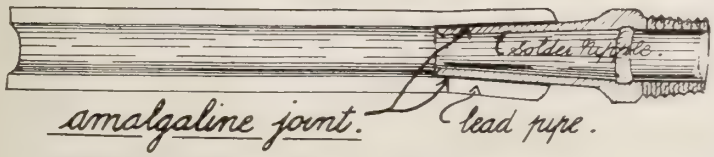

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THE SANITARY ENGINEER

VOL. X. AUGUST 1, 1916 No. 15

Public Comfort Stations

Their Location, Plan, Equipment and Care — Above-Ground Versus Underground Stations—Financial Considerations.

By Dr. Wm. Paul Gerhard, consulting engineer, New York City.

Reprinted from "The American City."

No [illegible] city on public health matters than Prof. W. T. Sedgwick, in his annual presidential address at the Rochester meeting of the American Public Health Association in September, 1915, declared that "probably the most flagrant failure in American sanitation to-day is the most universal lack of public convenience or comfort stations in American cities and towns." Concluding his address, he stated: "Failure to provide public toilet facilities in our towns and cities is to fail in one of the very elements of sound public health service." In the light of these words it would seem worth while to devote some space in The American City to a further discussion of this seemingly trite [illegible].

Convenience or comfort stations are public buildings or structures intended to afford toilet conveniences for either one, or else for both sexes. The latter type has a complete installation of water-closets, urinals, lavatories, drinking fountains and other toilet accessories, also rest rooms, and sometimes other public utilities, while the former are usually restricted to urinal fixtures.

All up-to-date municipalities should take pride in providing a sufficient number of such utilitarian structures, not only for their citizens and for many city employees whose work is outdoors, but also for their visitors.

The construction and design of a comfort station present at times peculiar problems, and its engineering features, such as the sanitation, the lighting, the ventilation and the waterproofing of walls and floors, are naturally of prime importance. It is therefore advisable to have such stations planned by competent sanitary engineers, who may associate with them architects or architectural designers to satisfy the esthetic requirements which often arise.

Location

Structures of this kind should be located, first of all, in those business districts where people congregate at certain periods of the day in large numbers, and, second, wherever there appears to be a lack of the commonly accepted substitutes, by which I have reference to the toilet rooms of hotels, office buildings, railroad stations and department stores.

The points in the city plan where the main arteries of traffic cross each other would seem to be those which ought to be given the preference. Street intersections and open spaces in the city plan usually offer favorable sites, likewise the public markets and public buildings, such as city halls, court houses and public libraries. In the case of these buildings the comfort stations should be planned with independent entrances from the sidewalk, because otherwise the legitimate traffic in the buildings might be unduly congested and interfered with. In connection with street railway transfer or waiting stations, such buildings might be erected by the municipality under a special agreement with the street railway company. This is often the case in European cities when the street railways are owned and operated by the city.

Entrance to Comfort Station below a Public Building in Denver.

Interior of Denver Public Comfort Station.

Other points where they would be of the greatest service to the people are the subway stations, the public city squares, the parks and playgrounds, the recreation piers, the public bath-houses, the sea-bathing establishments and the cemeteries.

In selecting suitable locations, any possible objections from mercantile establishments should be given due consideration. Cases may also arise where property owners will raise the claim that a public comfort station would cause a depreciation in the value of their properties. Mere prejudice should be firmly and judiciously met, and objections to an otherwise proper scheme set aside, unless they are good and valid.

Objectionable Types

Before taking up the description of approved types of comfort stations, a few words should be said about undesirable or objectionable types. The primitive, unscreened, or imperfectly shielded places, which may be seen in Latin-European countries at the public stairways, at corners of buildings, including even the cathedrals, at angles of bridges, and other places, hardly deserve even a passing remark. How any enlightened community can for a moment tolerate such abominations, and how it can permit the waste to be disposed of by letting it run across the sidewalk into the street gutter, must remain forever a matter beyond comprehension.

Objectionable types like the above and others have led some well-meaning people to conclude that such stations should be put "out of sight," and hence that underground stations are preferable. But I shall be able to demonstrate further on that there is absolutely no good reason why an aboveground station cannot be so designed as to be attractive, yet unobtrusive.

In some cities one finds damp, dark and ill-ventilated stations, containing only the crudest toilet facilities, some of them underground, others at street corners, and it is to such places as these that a recent report in the Canadian Sanitary Engineer must have reference when it says:

"The comfort station which shamefacedly hides itself underground, or in a corner, is left to be used only by the lower class of the population. City councils are apt to deny to such places a proper appropriation for maintenance. The riff-raff who form the majority of the patrons bring to the place the filthy habits of their lives, and thereby make the work of maintenance more difficult and more expensive."

Approved Types of Comfort Stations.

We may distinguish (1) small comfort stations, which provide only urinal accommodations, with possibly one or two lavatories ,and (2) complete stations with water-closet, urinal and lavatory accommodations, with sometimes pay compartments and other accessories.

The first-named types hardly exist in any of our cities, yet there is not the slightest doubt that they are a real necessity and that they are very much wanted. Such smaller stations can be built at a very much lower initial cost, yet they can be made architecturally inoffensive and attractive to the eye, and, what is of far greater importance, they can be operated at a very low annual cost of maintenance, since they require only a minimum of attendance. European cities have long ago recognized their necessity, and it is my personal view that in the larger cities of this country the next step should be to pay much more attention than heretofore to the erection of a larger number of smaller stations. I should not be doing my subject justice if I were not to lay special emphasis on these facts.

The more complete type of comfort station may be subdivided into (a) aboveground and (b) underground stations.

Above-Ground Stations

Above-ground stations are not very numerous in the United States, but both in France and in Germany they are the preferred type. To me the principal advantage, from a sanitary point of view, of the above-ground station appears to lie in the fact that the building is sure to be well-ventilated and to receive sunlight and outside fresh air, nature's best disinfectants, in abundance. It is well-known that plenty of light is the greatest foe to dirt, uncleanliness and slovenliness. Those who have made careful sanitary inspections of such places will appreciate the force of this remark. A further considerable advantage is that the cellar under the building becomes available for the necessary heating apparatus, and for the numerous plumbing waste and supply pipes, traps, cleanouts and other fittings, thus keeping them accessible for repairs, or to remove stoppages, and under the complete control of the attendant. Where a rest or emergency room is included in the features of the station, a much more cheerful and useful room can be provided if the main floor is above ground.

It is true that some study should be given so as not to have an above-ground station too conspicuous, but on the other hand there is no reason why it should be an architectural monstrosity. The outer walls can with a very slight effort be embellished with climbing vines and flowers, and the building may be partly hidden by attractive shrubbery, as numerous examples in German cities prove.

Among the disadvantages I should mention that the city street plan is sometimes unfavorable, rendering suitable sites difficult to find, especially so in the congested districts, also that such a building in some cases would prove to be a real detriment to a neighborhood. Such facts would point to the desirability of building an underground station in such a locality.

Underground Stations.

It is claimed by some that underground stations are more economical in construction, but this assertion may well be doubted when it is considered

Small Comfort Station in Tarresdale Park, Philadelphia.

New Comfort Station in New Orleans. The trellises will be covered with roses.

Comfort Station Waiting Room in Public Square, Cleveland.

Underground Public Comfort Station in Ontario Square, Philadelphia.

that in all such cases one has to contend with increased difficulties in providing adequate ventilation and ample lighting, and in making the walls and floors of the underground structure perfectly waterproof. Nor should the all-important matter of proper sewerage be overlooked. Where drainage facilities are inadequate, or the street sewer is at an insufficient depth, recourse must be had to pumping, and while the mechanical difficulties of a pumping installation are not insurmountable, I do not share the view that "pumping the sewage is a simple and ready solution." Many of the toilet rooms of the New York Subway stations dispose of their sewage by automatic sewage ejectors, and quite often in the past the public has found these toilet rooms "closed and out of order."

Numerous stations in English cities and examples of recently erected underground stations in American cities show that it is possible to make them architecturally acceptable and sanitary; but where it is possible to construct them above ground, as in the parks and in residential districts, it is in my judgment decidedly better to do so. Parts of underground stations which necessarily show above ground should always be made attractive in appearance.

Plan

The large comfort stations are always planned to comprise two distinct sections, one for men, the other for women. The plan should be as simple and open as possible, and there should be wide passageways to prevent any congestion during hours of greatest use. In the men's section there should be a sufficient number of water-closets, urinals and lavatories, also one slop-sink and a drinking fountain. The urinals, being the fixtures most used, should be placed nearest to the entrance, and ample width should be given to each urinal stall. If possible the fixtures should be located against the walls, as this helps the attendant in overseeing the place. There should be back of the fixtures a so-called utility corridor, giving access to the flushing tanks, the pipes, valves and other fittings. A plan with fixtures standing back-to-back is not so good, as it interferes with a ready oversight of the station.

Statistics having shown that not more than 15 to 20 per cent. of the users of stations are women, it follows that the women's section should have a much smaller number of fixtures and that the floor space required need not be so large. The fixtures provided are water-closets, lavatories, slop-sink and a drinking fountain. If a rest or emergency room is included, it is usual to put this on the women's side. Space should also ge provided, if the station is an underground one, for the heating apparatus, the ventilating apparatus, and for an attendant's tool and locker room.

In addition to the fixtures for free use by the public, some stations provide a limited number of pay toilet compartments, securing greater privacy in use and offering greater cleanliness or a higher grade of fixtures. The question whether or not to provide such pay compartments depends upon several factors, such as the character of the city district, the nearness or distance from hotels, etc. In some comfort stations the pay compartments have brought in a considerable revenue, which helps to reduce the cost of maintenance, while there are other instances on record where the pay stations received so little patronage that the pay feature had to be abandoned.

The provision of a cellar is generally not feasible in an underground station, but for above-ground stations a cellar is always desirable, for reasons already given.

In planning the approaches to a comfort station the aim should be, in all types, to keep the entrances for men and for women as far from each other as possible. The entrances should be conspicuously lettered, or, better, should be provided with universally adopted marks or signs designating respectively the men's and the women's sides.

Entrance steps for underground stations should, if practicable, be covered so that the steps may not become slippery with ice in winter weather. Strong hand rails should always be provided and the stairs should be well-lighted.

Construction

For the proper maintenance of the building it is essential that its construction, as well as its equipment, should be absolutely sanitary. The entire interior should present at all times a "spotlessly white" appearance. Accordingly, the floors, the walls and the ceilings should be finished in light colors—to show the dirt if there is any—and all materials used should be non-absorbent and readily cleanable. The walls and floors should be impervious, permitting the turning-on of the hose to wash them at frequent intervals. White glazed tiles and white enameled brick are among the most suitable materials for wall finish. The floors should be waterproof and finished in unglazed tiles or in mosaic work. They should be graded to one or more points, at which floor drains should be provided for proper drainage. Dark marble and all kinds of slate should be avoided for compartment partitions. These should be always raised from the floor. No woodwork is permissible in such places except the wooden doors, and these should be just large enough to afford privacy. White enameled steel doors would be an improvement, as wooden doors are apt to warp from the dampness.

In some comfort stations doors are omitted entirely except at the pay compartments. Even the wooden toilet seats may be dispensed with by using fixtures with integral porcelain seats .

(Continued in Next Issue)

Analysis of Canadian Sanitary By-laws

Being a Proposed By-law to Regulate Sanitary Engineering Construction in the City of Ottawa—The Sanitary Engineer Takes Full Responsibility for All or Part of Any Criticism Made on this By-law.

THE next section to comment upon is that of section 80. It is general to a certain extent.

The latter part is commendable where it states that if the plumbing inspector fails to examine the work within the specified period of twenty-four hours, there is no justification to have the work covered up.

In many cases we have been informed that a neglectful inspector has wilfully left work uncovered the full period and more, and has thus given the plumber installing the work an opportunity to cover up work without it being inspected. Section 80 is as follows:

Section 80. The Medical Officer of Health shall be notified whenever any work is ready for inspection, and the party making application therefor shall furnish the number and date of the permit issued for such work and the name of the street, and where possible, the number upon such street at which the building is situate. All work shall be left uncovered and convenient for examination until it has been inspected and approved of, and when approved of, a marker furnished by the Inspector shall be placed in a suitable position. The inspection shall be made as speedily as possible after receipt of notice to inspect, and where practicable within twenty-four hours, but failure to inspect within such period shall not authorize the closing in or covering up of the work.

Section 81. The Medical Officer of Health, the plumbing or assistant plumbing inspector shall require a water and a smoke test to be made of all work, and every such test shall be made by the plumber whose work is being inspected, but in the presence of the Medical Officer of Health, the plumbing or assistant plumbing inspector. The Thompson or Wood approved make of machine capable of generating a sufficient volume of smoke shall be used for the purpose of making the smoke test. In testing new work between December 1st and March 31st both dates inclusive, in any year, should the weather not permit the use of the water test, a 5-lbs. pressure gauge test shall be applied in lieu thereof. The smoke test shall in all cases be applied to the finished plumbing work by the master plumber or his workmen in presence of the Medical Officer of Health or of the plumbing or assistant plumbing inspector before the work is handed over to or accepted by the owner, and no plumbing work will be considered complete which has not had a smoke test and water test, or a smoke test and pressure test applied and found tight; for the purpose of inspection, plumbing work will be considered finished when all fixtures are fixed in place. If the work has been tested and has been found tight and satisfactory, the plumber or the owner shall be entitled to receive from the Medical Officer of Health a certificate certifying that the work has been approved of.

While most of this section is general, there is one portion which is to be highly commended—that where tests are to be made during the period between December 1 and March 31, when the climate is too severe, a 5-lb. air pressure test is demanded. In the opinion of The Sanitary Engineer this could be made much more effective if a 10-lb. test were called for. But it is a step in the right direction, and at no future date, it is to be hoped, that the water test will be eliminated altogether, thus making the severest test a uniform one.

The water test is by far too severe at the foot of a stack of any ordinary length, while the top section is not sufficiently severe.

Section 82. The record of every inspection shall be recorded in a book kept in the office of the Medical Officer of Health. If upon being tested the work is found not satisfactory, the owner shall have two (2) clear days next thereafter the day upon which the test was made within which to complete the work, and if the same is not made satisfactory within that time or within such extended period of time as the Medical Officer of Health may allow, in writing, for such purpose, all such work or such part or parts thereof as shall have failed to pass the said tests shall be forthwith torn out and removed from the building in which such defective work is placed, and in every such case the plumbing inspector and his assistant may enter in and upon the said building and premises at all lawful hours, and may tear out, demolish and remove all such defective work, doing no unnecessary damage to the said building or premises, without being answerable in damages or otherwise to the owner thereof, and the owner thereof and the master plumber who have placed or caused such defective work to be placed shall also be subject to the penalties prescribed by this By-Law.

Section 82 has several novel features embodied in it, which if enforced will be a boon not only to the public, but to the trade as well.

The writer not very long ago had a case mentioned to him of poor work being installed where no less than eleven inspections were necessary before the job was finally passed. It was a case of poor workmanship, and when the work was allowed to pass, it was nothing but a poorly botched job, though, of course, it complied with the by-law. Such a section if enforced will dispense with the incompetent man doing work, thus serving the public better, by raising the standard of work all round. It cannot be denied that in plumbing construction there are far too many repairs, and the public will be saved a lot of these unnecessary repairs if work is done in a more workmanship-like way in the first instance. The enforcing of section 82 will effect this, and none too soon for all concerned.

Section 83. No person shall, without a permit from the Water Works Department, open or shut off the street stop-cock connected with the service, supplying the premises or building whereon or in or about which any plumbing work has been, or is in course of being done, unless in case of urgent necessity, to prevent loss or damage from flooding, or when a plumber requires to do so in order to make the necessary repairs, or to test his work, and in every such case he shall leave the stop cock as he found the same, and every person who shall commit any damage, or injury to any stop cock on a service pipe of the water works, shall be liable to the Corporation for the amount of such damage.

Section 84. No lead pipe used for conducting water or for withstanding water pressure shall weigh less than designated upon the following:—

Pipe of ½-inch internal diameter, 5 lbs. to the lineal yard.

Pipe of ⅝-inch internal diameter, 7 lbs. to the lineal yard.

Pipe of ¾-inch internal diameter, 10 lbs. to the lineal yard.

Pipe of 1-inch internal diameter, 13 lbs. to the lineal yard, and proportionately, where pipe of a larger diameter is employed.

Section 85. All water pipes up to and including one inch inside diameter placed under ground shall be of lead, and of or exceeding the weight per lineal yard specified in section 84.

Section 86. All brass piping used for conducting water or to withstand water works pressure shall be in standard wrought iron sizes and shall be properly threaded. All fittings used upon water pipes shall be properly threaded. No slip joints will be allowed.

Section 87. All water supply pipes shall be laid at a sufficient depth to prevent danger from frost, and when laid outside of a building they shall be placed at least five feet below the finished grade. They shall not be placed back of the plaster or next to the outside walls of a building, and they shall in every case be properly laid and graded with a fall to a stop and waste cock placed under the cellar floor or in some other convenient place where they can be entirely drained off when necessary. Each consumer in a tenement building unless the service is metered, shall be supplied with a separate stop and waste cock on the service pipe placed inside the building.

Section 88. Every flat or apartment separately leased or occupied in any building shall be provided with a separate stop cock on the cold water supply, the same to be placed in the most visible and accessible position.

Section 89. No service is to be reduced in size between the street line and the private stop cock inside the foundation of the building.

Section 90. Every water cock bib, or hydrant, attached to any water service or pipe, connected with and supplied from the water works system, shall have legibly stamped thereon in a conspicuous place, the name of the maker, and shall be properly tested both as to strength and weight before being so attached. All such tests shall be made by the Water Works Department and every such attachment shall be stamped by the Department before being attached to any civic water service or pipe.

Section 91. All work governed by the provisions of this By-Law shall be done in a workmanlike manner, and shall be subject to the inspection, supervision and approval of the Medical Officer of Health, or of the plumbing or assistant plumbing inspector; and all such work shall be done only by a licensed master plumber, or by a regularly trained, practical and experienced plumber, and all faulty or defective work which may at any time be discovered shall be made perfect to the satisfaction of the Medical Officer of Health, or such Inspectors, and when found satisfactory, a certificate certifying thereto may be issued to the plumber who completed such work at the expiration of seven (7) days from date of inspection, unless in the meantime such work shall have become faulty or defective.

Section 84 is another instance where the interest of the public is safeguarded, in that it specifies the weight which all water pipes are to be. The use of light weight lead pipe has long been the cause of a lot of unnecessary repairs, as well as untold damage to property.

With the last sentence in section 86 we scarcely agree, because of the fact that there are joints which would come under the title of "slip joints," that are without doubt a very dependable joint, and under many conditions these "slip joints" would be preferable. The rest of this proposed by-law deals with matters of a general nature, and need no further comment.

Section 92. Whenever it shall come to the knowledge of the Medical officer of Health, or complaint in writing shall be made by any person that the plumbing or drainage in or about any building has become a nuisance or that the same does not conform to the provisions and requirements of this By-Law, or that the same is of faulty construction and liable to breed disease, or to endanger the health of the occupants of such building, the Medical Officer of Health shall direct the Plumbing Inspector or his assistant to examine the plumbing or drainage in such building, who shall report his findings in writing to the Medical Officer of Health and suggest all such changes as are necessary to make such plumbing conform to the provisions of the By-Law, and notice in writing shall thereupon be given the owner of such building of the changes which are necessary to be made in said plumbing or drainage. Such changes and additions as may be notified in writing to the owner of such building shall be made and completed within such time as shall be fixed for that purpose by the Medical Officer of Health; but should the owner refuse to carry out such work as may be directed, then the Medical Officer of Health may, if in his opinion circumstances warrant such action, cause such premises to be closed as not fit for human habitation or dangerous to health, and may placard the same with a notice affixed thereon setting forth the reason for such closing, and no person shall thereafter so long as such defective plumbing or drainage remains unrectified, occupy or use the same for human habitation, and the owner of such building may in addition thereto be proceeded against for the recovery of the penalties provided in case of violation of the provisions of this By-Law.

Section 93. The Corporation may upon the recommendation of the Medical Officer of Health appoint such Inspectors of plumbing as may be found necessary for the due enforcement of this By-Law. No such Inspector shall be appointed until he shall have first passed such examination as shall be considered proper by the Medical Officer of Health. Every such Inspector shall be under the supervision and direction of the said Medical Officer of Health.

Section 94. The Medical Officer of Health may have prepared and may approve of a set of standard working plans designed to exhibit the manner in which work done under provisions of this By-Law shall be carried out and placed in position, and may from time to time add to and amend the same. All such plans shall be available for inspection by all proper persons at the office of the Medical Officer of Health.

Section 95. The illustrations and diagrams set out in the schedule annexed hereto shall be referred to and read for the purpose of illustrating the provisions of this By-Law and for the purpose of indicating the manner in which work governed thereby shall be carried out and placed in position.

Section 96. Any person convicted of a breach of any of the provisions of this By-Law shall forfeit and pay at the discretion of the convicting Magistrate, a penalty not exceeding the sum of fifty dollars ($50.00) (exclusive of costs) for each offence and in default of payment of the said penalty and costs forthwith, the said penalty and costs, or costs only, may be levied by distress and sale, of the goods and chattels of the offender, and in case of there being no goods or chattels found out of which such penalty can be levied, the convicting the Magistrate may commit the offender to the common jail of the County of Carleton, with or without hard labbour for any period not exceeding six (6) calendar months, unless the said penalty and costs (if any) including the cost of the said distress, and of the committal and conveyance of the offender to said jail are sooner paid.

Given under the Corporate Seal of the City of Ottawa this day of.....
.....A.D. 1915.

Certified:

City Clerk Mayor.

(Concluded.)

Rural Sanitation

A Continuation of the Sanitary Science Course That Has Been Appearing in the Sanitary Engineer, But Having Particular Reference to the Sanitary Disposal of Household Wastes in Unsewered Districts

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 7

Sub-Surface Irrigation (Continued)

THE size, shape and amount of tile, the depth below the surface at which the tile is laid and the spacing or arrangement of the various runs or lengths of tile are all important points to be considered for a successful sub-irrigation system.

In a preceding Article (see Article 5 issue of 15th June) it was shown that the liquid sewage from a septic or settling tank is by no means purified. It is only in the soil surrounding the open-jointed tile that purification can be accomplished.

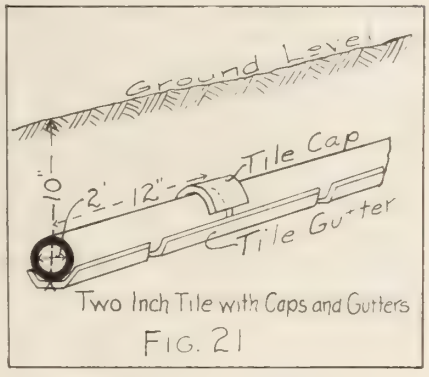
Purification consists in suitably changing unstable organic matters that are found in solution or as small particles in the liquid flowing or discharged from the septic tank.

It is now a well known fact that it is the bacteria in the soil that are able to bring about the necessary chemical changes for the purification of sewage when applied in suitable ways on or below the surface of the ground. Some of these bacteria were shown in the figures accompanying article 3 (issue of 15th May) and their various actions were explained therein. At more than three feet below the surface of the ground practically no bacteria are ordinarily found but at a few inches below the surface the conditions are most favorable for their natural development. In soil to which sewage has been added as many as 3,000,000 bacteria in one ounce of soil have been found.

The chemical result of the bacterial action is that what might be termed slow burning or oxidation of the organic matter or impurities takes place. In Article 3 of this course it was stated that to the various constituents in sewage when plenty of air (which contains oxygen) was available, the following changes took place:

Carbon, hydrogen, nitrogen and sulphur present in sewage as various chemical organic compounds are oxidized to carbon dioxide, water, nitric and small amounts of sulphuric acids respectively. To accomplish the above changes it is essential that the soil be well aerated and heavy or clay soils are consequently not naturally suited to sub-surface irrigation. To neutralize the acids formed in the oxidation of organic matter the soil should be alkaline. Also most soil bacteria will not thrive if the ground is sour or acid and under such conditions they will not oxidize the sewage brought to them.

Whether disposing of sewage or other dead vegetable or animal matter, it is very important that the bacteria should be under favorable conditions for changing such organic matter into suitable compounds for future plant growth. The farmer has learned by experience that it is necessary to keep his land sweet or alkaline instead of sour or acid and for centuries lime has been added to the soil used for agricultural purposes. For the purpose of sewage disposal the same principle applies and if added at the rate of two or three tons per acre lime applied to heavy soils will serve to loosen the soil and will tend to keep it



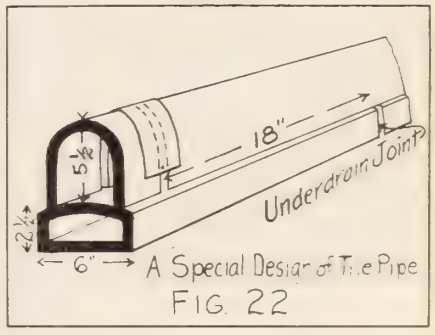
Two Inch Tile with Caps and Gutters
FIG. 21

from becoming sour. One hundred to two hundred pounds of lime is probably sufficient for the ground above the average sized sub-surface tile system.

The lime used may be in the form of pulverized marl, chalk or limestone. Generally, however, these minerals are heated (calcined) with the result that quicklime CaO is formed, carbon dioxide CO_2 being driven off by the heat. The quicklime may be then "slaked" with water and the slaked lime Ca $(OH)_2$ added to the soil. The best practice is, probably, to allow the quicklime to be exposed to the air for some time from which it will slowly attract water vapor and carbon dioxide. The "air-slaked" lime resulting is a powder which is a mixture or possibly a combination of carbonate $CoCO_3$ and hydrate Ca $(OH)_2$ of lime. For the purpose mentioned herein quicklime, unslaked, should never be applied to the soil.

The ordinary domestic sewage is fortunately alkaline. This can be easily demonstrated by the use of small piece of red litmus paper which when dipped in the sewage will generally turn blue. This alkalinity is caused by the use of washing soda (sodium carbonate Na_2CO_3) in the household and by certain chemical actions that occur in the sewage itself with the formation of ammonia and ammonium compounds which are alkaline. If for any reason, however, the sewage reaching the tank is acid, neither the anaerobic bacteria in the tank or the aerobic bacteria surrounding the tile will thrive well; the sewage is "antiseptic". To overcome this condition soda ash (crude washing soda) or lime may be mixed with the sewage.

In the soil surrounding the tile the



A Special Design of Tile Pipe
FIG. 22

slow burning of the organic matters produces heat just as the much fiercer combustion in a furnace produces heat though in greater amounts. There is doubtless sufficient heat produced to allow of a sub-surface irrigation system even in localities where the cold is very severe. Particular precautions are however necessary if the system is not to be regularly used during the winter. The writer is of the opinion that where the ground freezes down as far as 9 or 10 feet in the winter, the soil around the tile might freeze if the system were unused for some time. Under such conditions, trouble would likely be experienced if it was desired to use the system again in the cold weather. Pouring hot water into the system has been advocated by one writer as a means of helping to keep the system open in winter. In the Sanitary Engineer for 1st September, 1915, page 29, the fol-

lowing advice is given in regard to a disposal system if it is not to be used for some time in the cold weather:

"Allow the sewage in the dosing chamber to flush out completely. Then pump half the contents of the first tank from the bottom into the dosing chamber and flush it out into the tile pipe about twenty-four hours after the dosing chamber had been previously discharged. Then cover over the top of the tank with a layer of straight straw, and cover with good manure with as little straw in it as possible. The tile does not need to be covered, except as a precautionary measure."

It is evident that the solid matters from the first tank flushed out into the tile pipe will supply food for bacterial action for a long time, the temperature resulting being no doubt sufficient to keep the soil unfrozen around the tile.

It might be a matter of interest at this point to take up in some detail the differences between a leaching cesspool and sub-surface irrigation method of sewage disposal. Under certain conditions such as a dry, porous and well drained soil, cesspools appear to take care of sewage satisfactory as very frequently but little solid residue is found in the cesspool even after considerable use. The cesspool acts like a septic tank liquefying and breaking up a large part of the solids. The liquid seeps out into the surrounding soil and a certain bacteial reduction of the liquid results. But even under the most favorable conditions total purification of the sewage is seldom accomplished and unpurified liquid sewage with its possible attendant disease bacteria may in time find its way to the source of some water supply. The only safe position to take is to regard every cesspool as insanitary.

As compared with the cesspool the apparent advantages of a well designed sub-surface irrigation are:

(1) The specially designed septic or settling tank is easily cleaned when necessary and provides for greater efficiency in liquefying or settling out solid matters than a cesspool.

(2) While the cesspool has but a limited seepage area surrounding its walls, as great an area of soil can be used as desired by increasing the amount of tile in the sub-surface system.

(3) Very few bacteria are naturally present at the depth at which seepage occurs from a cesspool but are in great numbers at the depth at which sub-surface tile are laid.

(4) By the use of a siphon producing intermittent flow the soil is given a chance to rest and aerate but in the soil surrounding a cesspool the bacterial action must go on continuously often resulting in clogging of the soil and sometimes in the overflowing of the cesspool.

In the various methods used for the purification of sewage it is generally found that disease bacteria are reduced in approximately the same proportion as the organic matters are oxidized. In the sub-surface method of sewage disposal under the best conditions, total purification with no disease bacteria in the effluent can no doubt be expected. However as an extra precaution it is essentially wise to have the effluent from even such a sanitary system empty or seep away as far as practicable from any source of water supply.

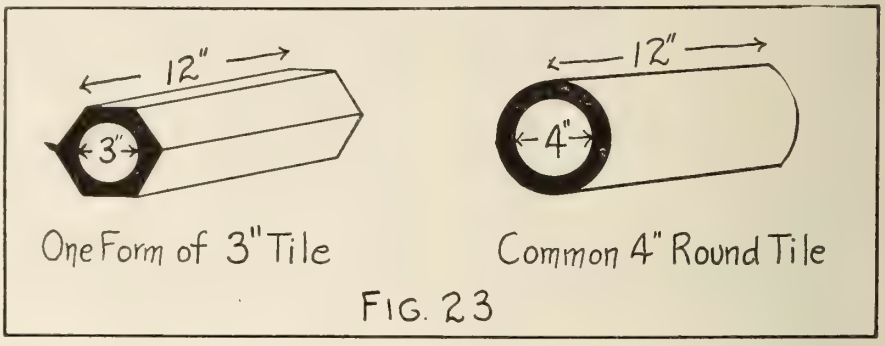


FIG. 23

Size and Shape of Tile

The following is an interesting extract from an engineering magazine of some twenty years ago:—

"The disposal of house sewage in suburban residents in a very troublesome question, especially where a public water supply is afforded without sewers —a state of things which is not compatible with public safety. Distribution on the surface is the simplest method, but this requires at least an acre about every house, in order to make it free from offense.

"It can be distributed in porous tiles about ten inches under the surface on smaller house lots if the conditions are favorable—viz.: a well-drained or porous soil.

"Whether on the surface or beneath it, there must be slope enough to allow the sewage to flow by gravity from the bottom of the cesspool to the place of distribution, otherwise pumping is necessary, which is, of course, onerous.

"When distributing in pipes beneath the surface, it is usual to lay 2-inch unglazed tiles, with joints at least one-fourth of an inch open, in trenches 10 or 12 inches deep, graded with a uniform fall of not over one inch in 10 feet at most, and sometimes not over half this amount. Sufficient ramification and length of pipe must be provided to give a capacity of at least one-half that of a cesspool or tank to be discharged; the other half is generally soaked away during the flow. It is important to secure an intermittent flow in the tiles. If a constant driblet flows into them they will always be choked in a short time. When on a larger scale, as for hotels and public institutions, Field's flush tank is used with success to secure this periodic or intermittent flow. If the water supply is limited to what is pumped by hand in the house the discharge can be made by means of a stop-gate laid in the outlet pipe leading from the bottom of the cesspool and operated by hand when required. The tiles adapted for this purpose are readily obtainable."

It is to be noted that 2-inch tiles are advocated. Col. Waring also advised tile of that size considering that when a separate settling tank as well as a flush tank was used that there would not be enough flocculent matter to interfere with the proper action of 2-inch absorption drains. Fig. 21 illustrates a run of tile as advocated by Col. Waring. The loose fitting tile caps and gutters are of larger radius than the outside of the pipe, their purpose being to prevent earth or other foreign matters getting into the tile.

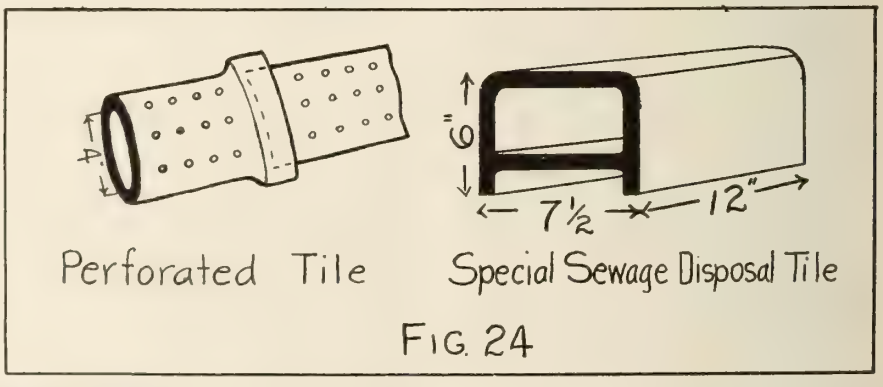


FIG. 24

The experience with drain tile for ordinary farm drainage may be cited as having some bearing on the question of size:—

"Owing to the great amount of friction in small tile compared with the volume of water they carry, the water runs more slowly, and hence they are much more likely to clog with sediment than the larger ones, so much so indeed that a 2-inch tile should never be used except on a steep grade. In time they are almost sure to clog on a slow grade. For the same reason the use of 2½ inch tile is not encouraged. Thus, although in most cases the 3-inch tile is not necessary for laterals, so far as the amount of water to be carried is concerned, yet this size is advisable because it is less likely to clog than the smaller ones. On especially slow grades even a 4-inch may be advisable. In Illinois 3-inch tile have been discarded entirely. The same is true of much of Essex County, in Ontario."

For sewage disposal it has also been found that 2-inch tiles are unsatisfactory not only because they clog more easily than larger pipes but for the following reasons as well:—

(1) The total length of tile may be unnecessarily great when only 2-inch pipes are used.

(2) As the liquid flows in the tile there may be sufficient room to allow of the free circulation of the air above the liquid in small tile and consequently the flow is impeded and aeration hindered.

Common 3-inch, 4-inch, and 6-inch tile are sizes now advocated. Probably the 4-inch is the most popular size (see Fig. 23) and the size most readily obtained from the small dealer in tiles, although 3-inch tile as shown in the same figure are frequently used. To larger tile there is the objection of increased cost for as will later be shown the total length of tile whatever be its size largely depends on the condition of the soil. The capacity of a 6-inch tile is four times that of a 3-inch tile but assuming it were found that 300 feet of 3-inch tile were necessary, one-quarter of that amount of 75 feet of 6-inch tile would not be sufficient to distribute the sewage over a sufficiently large area of soil for satisfactory bacterial action and 200 feet or more of 6-inch might be necessary.

Special tiles have been designed for sewage disposal and some are shown in Figures 22, 24 and 25. The distribution of the sewage in the tile shown in Fig. 22 has been stated to be as follows:

"The upper section of the double tile is for the distribution of sewage, and the lower portion for the collection of the effluent, and may be considered as the underdrain.

The two sections are laid up with broken joints so that sewage will have to travel half the length of the tiles, or at least 18 inches before it can find its way into the underdrain joints; and as the space around the tile is packed with filtering material, the sewage will have at least 18 inches of filtering material to pass through."

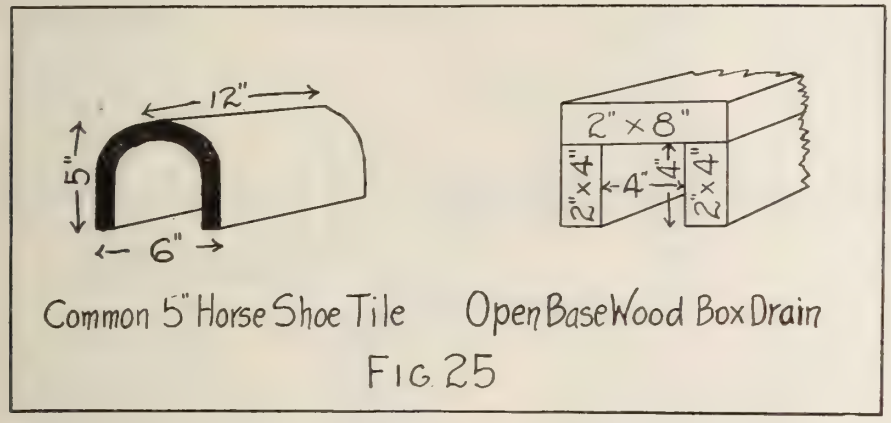


FIG. 25

Fig. 24 shows a special tile known as the Waring, of which the following description has been given by the manufacturers:

"The "Waring" sewage disposal tile is 12 in. long, 7½ in. wide and 6 in. high, with a horizontal partition. Sewage discharged into the upper channel is distributed at each open end-joint into the lower space, without scouring out the soil or causing settlement. The largest possible soil-contract area is thus obtained for the percolation of the sewage.

Common drain tiles, especially if laid on gutters or base-plates which shut off the soil below, depend mainly on lateral percolation for the disposal of sewage. The greater efficiency of the "Waring" tiles, in providing for distribution, lateral and downward percolation, soil contact and soil aeration, is indicated by the accompanying table.

In Fig. 24 there is also shown a part of a run of 4-inch perforated tile which may be used for sub-surface irrigation systems. Fig. 25 shows a horse-shoe tile which utilizes the soil thereunder to carry the sewage and its use is consequently limited to the heavier or clayey soils. A substitute for the horse-shoe tile where wood is more easily or cheaply obtained is shown in the same figure.

	Circumference in inches	Cross-Section in sq. inches	Capacity in U.S. gallons
"Waring" tile	25.07	26.03	1.35
5" horseshoe tile	17.86	13.56	0.70
4" round tile	15.71	12.57	0.65

Interesting Air Lift Installation

Pumping Installations of Greater Interest to Sanitary and Heating Engineers Than Ever Before in the History of the Trade—Compressed Air Now Playing an Important Part

THE air lift pumping plant described is installed at the National Transcontinental Railway yards, near the Quebec Bridge. The work was started in September, 1912, forty-three feet of 8-in. wrought iron pipe being driven from the surface to the rock, and from that point a 5-in. bore hole was started. The well was drilled entirely in shale, red and gray alternating. On September 30 a depth of 400 feet had been reached, and a rough pumping test yielded 200 Imperial gallons per hour. At 280, 520 and 700 feet respectively dry crevices were encountered, while at 775 feet water was struck in considerable quantity. The hole was then reamed to a diameter of 8 in., and a subsequent test yielded 3,200 Imperial gallons per hour.

At a depth of 980 feet, another water crevice was opened up, and at a depth of 1,012 feet drilling was discontinued. The whole well was then reamed out to 8 in. diameter. A large plunger pump was used for a 24-hour test, and with 400 ft. of rods in the well a yield of 5,400 Imperial gallons per hour was maintained. This pump was afterwards operated for eight days to clean out the well, and a sample of water was analyzed and reported satisfactory for both boiler and domestic purposes. When the well is

not being pumped, water rises to the surface; but when being pumped to capacity it drops to a depth of 400 ft. from the surface.

Principal Equipment Items

A joint contract was awarded to the Canadian Ingersoll-Rand Co. and Williams & Wilson, of Montreal, for furnishing and installing a suitable pumping plant, the air-lift system being finally adopted because of its lack of moving or wearing parts in the water, and because the air-compressor could be located any distance away from the well.

The air-compressor is a Canadian Ingersoll-Rand tandem compound, steam-driven machine, designed for a terminal pressure of 250 pounds, the air cylinders being fitted with a new type of valve known as the Cir-co-leaf valve, which is claimed to be absolutely noiseless in operation. The frame is fully enclosed, and the moving parts work in a constant flood of oil. A combined speed and pressure governor controls the compressor.

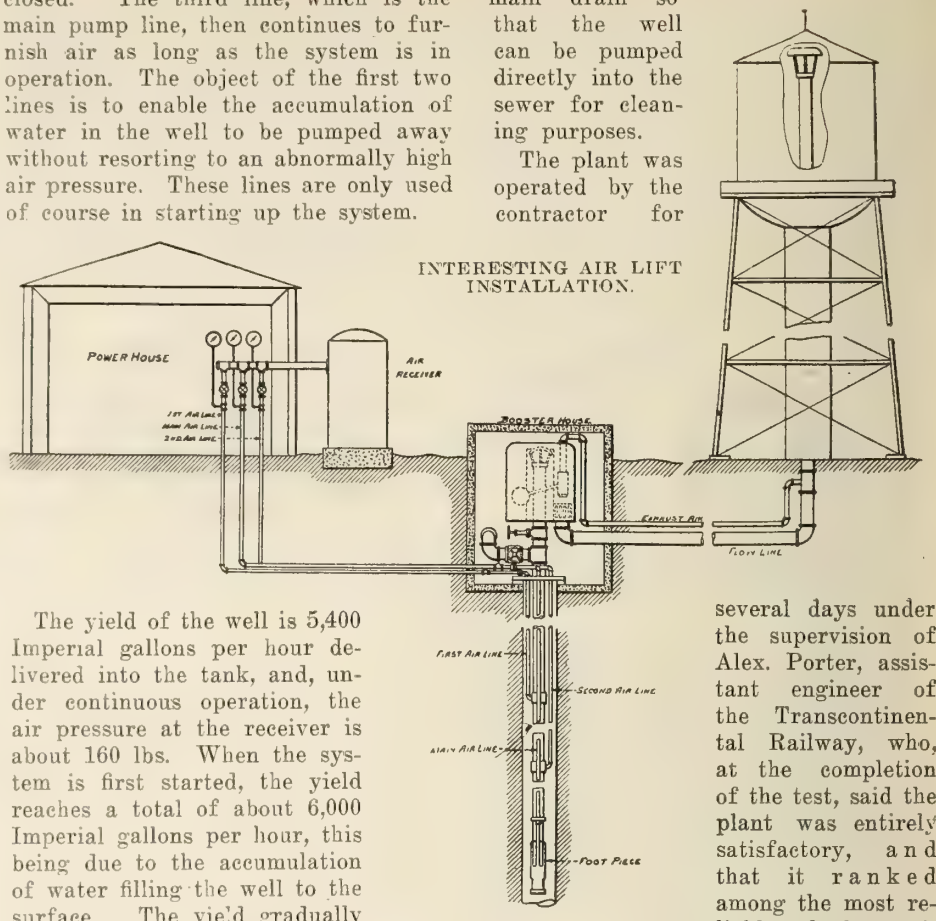
The air-lift foot-piece was manufactured by the Harris Air Pump Co., of Indianapolis, whose pumps are extensively installed throughout Canada. The column of water is carried by an air-jet situated below a choker, which arrangement eliminates slippage and causes the air to be distributed through the water in small bubbles. The booster pump was also furnished by the same firm.

Water is discharged into a steel tank 24 feet in diameter, and the total capacity, including the leg, is 61,170 Imperial gallons. The level of the water in feet is indicated by a register on the outside of the tank, by which means it is possible to accurately gauge the capacity of the plant. The tank is supported by a steel frame resting on a concrete base, in which are located the valves and connections to the service mains and to the main drain. Steam is furnished to the compressor at 110 lbs. pressure.

Air Line Features

Owing to the depth to which the water drops in the well, three air lines are used, two being tapped into the water discharge line at different depths, and the third entering the Harris foot-piece. Each of these three air lines is controlled by a gate-valve in the power-house, the engineer operating the system without going near the well, which is 250 ft. from the power-house. A gauge [illegible] shows the pressure and indicates the fall of the water in the well.

Air discharges from the compressor into a high-pressure air-receiver, and thence to the well. The first air line starts the water flowing and continues to pump until the well lowers as far as this line is capable of lowering it. Then the first air line is gradually turned off until the second line begins to act. When this line has lowered the water as far as it is capable of doing so, the work is taken up by the third line and the second line closed. The third line, which is the main pump line, then continues to furnish air as long as the system is in operation. The object of the first two lines is to enable the accumulation of water in the well to be pumped away without resorting to an abnormally high air pressure. These lines are only used of course in starting up the system.



INTERESTING AIR LIFT INSTALLATION.

The yield of the well is 5,400 Imperial gallons per hour delivered into the tank, and, under continuous operation, the air pressure at the receiver is about 160 lbs. When the system is first started, the yield reaches a total of about 6,000 Imperial gallons per hour, this being due to the accumulation of water filling the well to the surface. The yield gradually decreases under continuous operation until the normal capacity and pumping head have been reached.

At the surface the water has to be pumped horizontally a distance of 60 ft., and subsequently to a height of 90 ft. into the top of the steel tank. For this work a Harris booster operates in conjunction with the air-lift. This booster consists of a steel tank resting on the top of the well-casing and receiving the water as it discharges from the well. The operating parts consist of a float and valve located inside the tank. The water and air are separated in this tank, the air rising to the top and maintaining sufficient pressure to force the water to the elevated tank. As the solid column of water discharges, the float drops, allowing the surplus air to exhaust from the tank. This whole operation requires only a few seconds, as a discharge takes place every time the booster is about two-thirds full. In fact, practically a constant flow is maintained.

The surplus air may be piped back to the compressor intake or discharged into the vertical riser to lighten the column of water and reduce the operating pressure. This latter plan was followed in the case of the plant at Quebec. The booster is automatic in operation and requires no attention. It also operates without noise. This apparatus is located in a concrete sump below the ground and is reached through a door in the roof. A by-pass is connected to the main drain so that the well can be pumped directly into the sewer for cleaning purposes.

The plant was operated by the contractor for several days under the supervision of Alex. Porter, assistant engineer of the Transcontinental Railway, who, at the completion of the test, said the plant was entirely satisfactory, and that it ranked among the most reliable of the various railway divisional pumping units. The high lift is a noticeable feature, amounting as it does to about 500 ft. vertically and 60 ft. horizontally. It demonstrates as far as it goes that there is practically no limit to the height to which the air lift will raise water if a fair submergence is obtainable.

Test Data

On a test recently made the plant pumped nearly 6,000 Imperial gallons per hour; but, as already stated, this capacity was due to accumulated water, and was, of course, only temporary. The normal capacity, 5,000 Imperial gallons per hour, was developed continuously after the level dropped to 400 ft., at which point the running pressure was 160 lbs. per sq. in.— Compressed Air Magazine.

A NEW INVENTION

T. E. Lewis, a British inventor, has patented an engine which he claims incorporates an entirely new principle. It is stated that this new engine retains its efficiency unimpaired in the case of gas, steam, oil, petrol, or air, and can be made a rotary or stationary type. It dispenses altogether with the use of cranks and connecting rods, while the speed attained and the regularity of movement are said to be phenomenal.

THE SANITARY ENGINEER

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INDUSTRIAL HYGIENE

ONE of the greatest subjects in preventive medicine is industrial hygiene, says the Weekly Ontario. While the movement is comparatively new, tremendous strides are being made to improve conditions of the worker in the shops, mills and factories, and to lessen the amount of sickness and decrease the number of deaths due to hygienic conditions.

Legislation is required to improve working conditions in shops and factories which arise because of greedy indifference and ignorance of the employer, but these conditions are also due partly to the workingman himself—to his own ignorance and carelessness.

It means better light, better ventilation, proper drinking water, drinking fountains, improved sanitary arrangements, proper temperature and the latest devices or appliances for the health and safety of the worker.

Many of the occupational diseases may be lessened by inspection, education and penalties. During the past few years much progress has been made. The rate of sickness and death due to the industries has decreased in consequence of humane legislation. As good legislation and adequate inspection increase, so will the health and happiness of the mill hand and the factory worker.

With better working conditions will come a decrease in the death rate of children born of factory workers.

It is refreshing, to say the least, to see the newspapers admit that the work of the sanitary and heating engineer is "one of the greatest subjects in preventive medicine."

Nothing in this world can possibly benefit the human race as can sanitary environment, and no worker can do so much to make every place, in or out of doors, fit to live in as can the sanitary, heating and ventilating engineer.

Therefore, it behooves every member of the craft to take note; do nothing without first thinking what the end may be. A poor installation may bring about insanitary conditions. We should be proud of our calling and do all in our power to blot out the opinion the public have of our craft.

If a member is known to do anything which will reflect upon us, we should resent it in a practical way and should be the first to bring the wrong-doer to task.

LITTLE THINGS

THAT it is the little things that count cannot be denied, and of all craftsmen, no fact should be considered more than by the sanitary engineer. Bacteria of certain kinds, which come under the title of microbes because of the fact that their presence is only proved to us by the use of the microscope, are about the smallest matter known to science, and until practically a few years ago, were paid little attention, yet at this date these "little things" and the attention given them is actually making this old world of ours worth while to live in.

Microbes, bacteria, germs or whatever heading this matter may come under, at once leads our thoughts to "little things," but what a power these little things wield? At the beginning of the ninth decade of the last century, bacteria were scarcely heard of outside scientific circles. To-day they are almost a household word, and every one, even our children attending the public schools know a great deal more about bacteria, both the good and the bad than the scientist of 100 years ago. Now, this brings us to a point where other "little things" of great importance are playing an important part in our career. The sanitary and heating engineer who is not heeding the "little things" which go to make up or mar his business will soon be overwhelmed by the influence which these little things play. The man who refuses or neglects to attend to the "little things" can never hope to make a "big success" and there never was a time more opportune than now when the average employer can cultivate the habit of attending to the "little things."

It is said of Sir Thomas Lipton that when asked how much capital he had when starting on his business career, he replied, "threepence" (just six cents), and, said he, "If I'd had fifty pounds I'd have been a failure. I had to look after 'little things' and they grew into 'big things.'" We cannot ever hope to look after "big things" if we neglect the "little things."

EDITORIAL BRIEFS

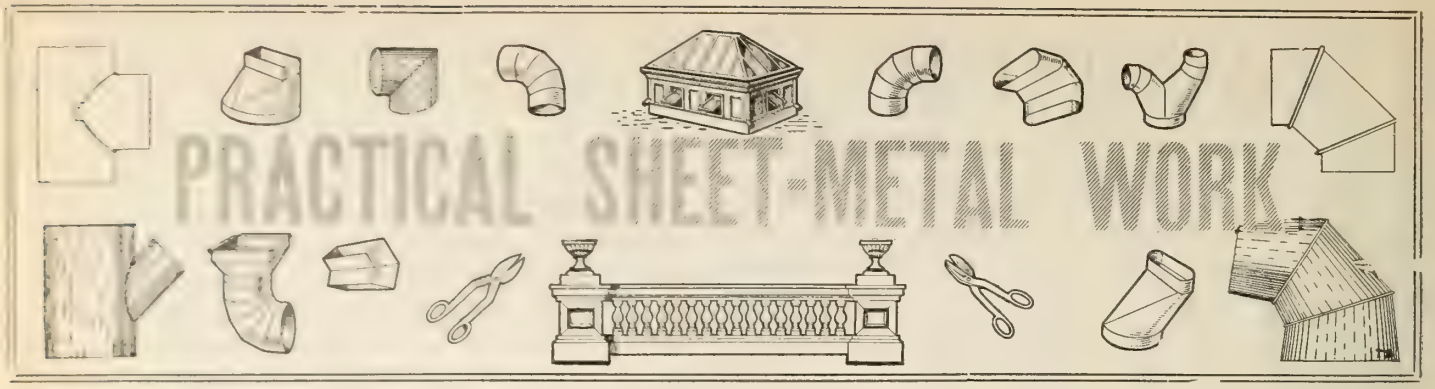
MATERIAL is visible as well as tangible service.

* * *

SELL something, don't be a basement or backyard plumber any longer than you can help. Get out into the open.

* * *

NO PERSON can see the value of the labor in a system of plumbing. There is a big gamble at stake when profit on labor is being considered. But to sell a bathtub at a certain price, or to sell a vacuum cleaner, you have sold something tangible. All labor is an intangible asset.



By CHARLES SEIVERS

IN the problem presented here we show a three-pieced tapered elbow, with all the taper in the centre section. This makes a neat elbow, and has several good points, such as not requiring as much height as an ordinary tapered elbow. Both ends being straight, they make a better joint with other pipes than when tapered, with the further advantage that the pattern of the centre-piece only need be developed, as the two end pieces are made with the regular three-piece pattern.

In elevation Fig. 1 we show a three-piece elbow. To lay out same proceed as follows:—Erect on a line, say A-B, one section of a three-pieced elbow, as shown by A. B. C, D, the diameter of which is the large end of the required elbow. At right angles to B-D mark line as E-F, on which line erect E. F, G, H, being one section of a three-pieced elbow, the diameter being the size of the small end of required elbow.

Connect points C-G and D-E, completing elevation of elbow.

On the base lines A-B and F-H draw a half circle, and divide into an equal number of parts as shown by 1, 2, 3, 4, 5, 6, 7. From the points thus obtained draw lines at right angles to the base lines and continue them on until they meet the mitre lines C-D and G-E. Continue these lines across centre section connecting point 2 on C-D to point 2 on G-E, 3 to 3, etc. Connect point 1 on mitre line C-D to point 2 on G-E, with dotted or broken lines, point 2 to point 3, 3 to 4, 4 to 5, 5 to 6, and 6 to 7.

The next step is to lay out the height of the different triangles. Parallel with H-F draw two lines as K-L and M-N. From the different points on mitre lines C-D and G-E draw lines parallel to A-B until they meet lines K-L and M-N, the points marked by solid lines being marked on line K-L and the points marked by broken lines on line M-N. This gives us the height and the base line of the triangle, but we have yet to obtain the measurement of the base lines.

To get these we must first make a plan of section C-G-D-E. Then draw a line as shown at R-S, parallel to A-B, extend centre line 4-4 from A-B until it meets line R-S; with this point as a centre draw a circle of the diameter of A-B.

At right angles to R-S draw lines from points 1, 2, 3, 4, 5, 6, 7 on mitre line G-E, then with the compasses mark out on these lines from R-S the distance from H-F to the points in half circle, the distance from H-F to point 2 being placed on line drawn from point 2 on mitre line G-E, H-F 3 on line from point 3, H-F 4 on line from point 4, H-F 5 on

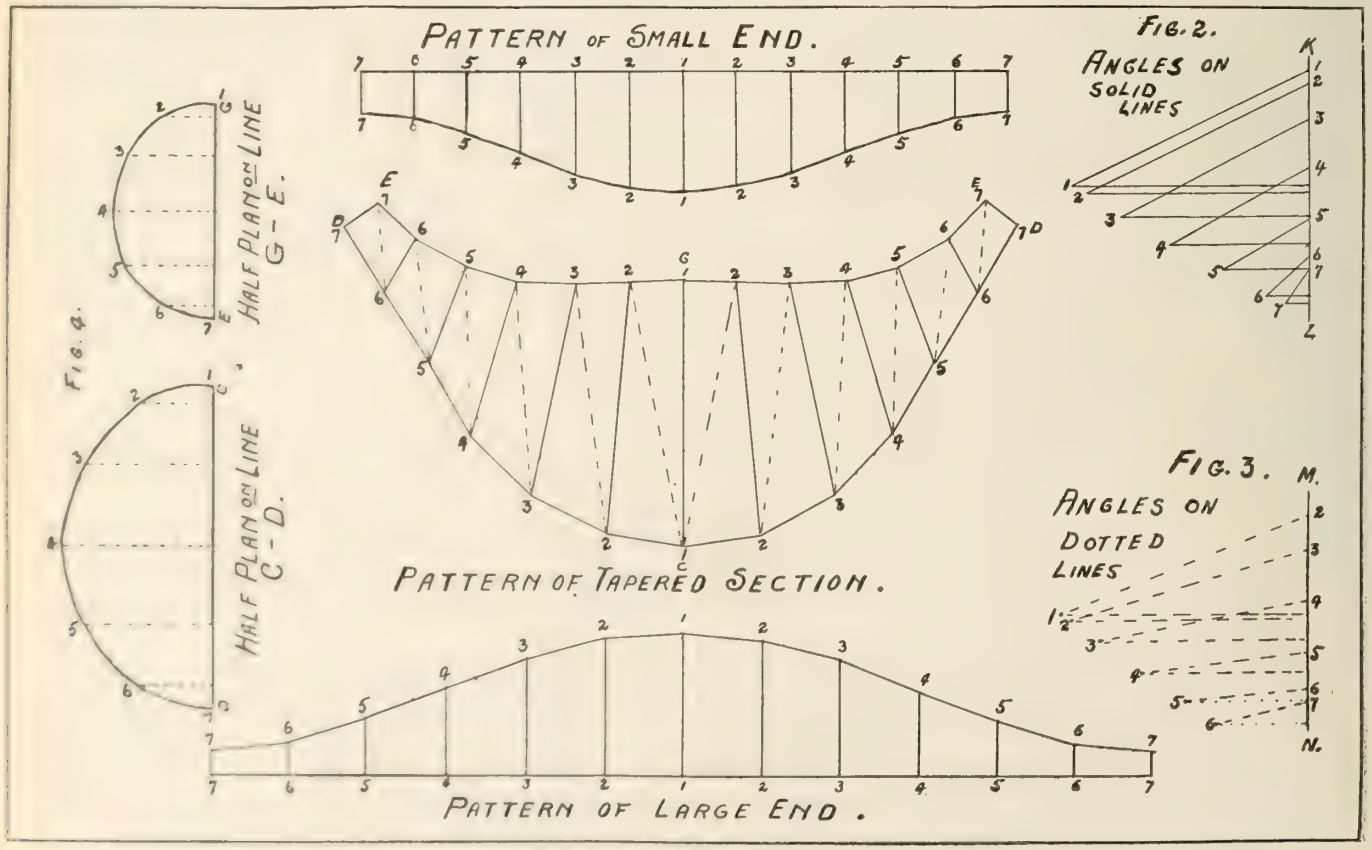


PLATE 41

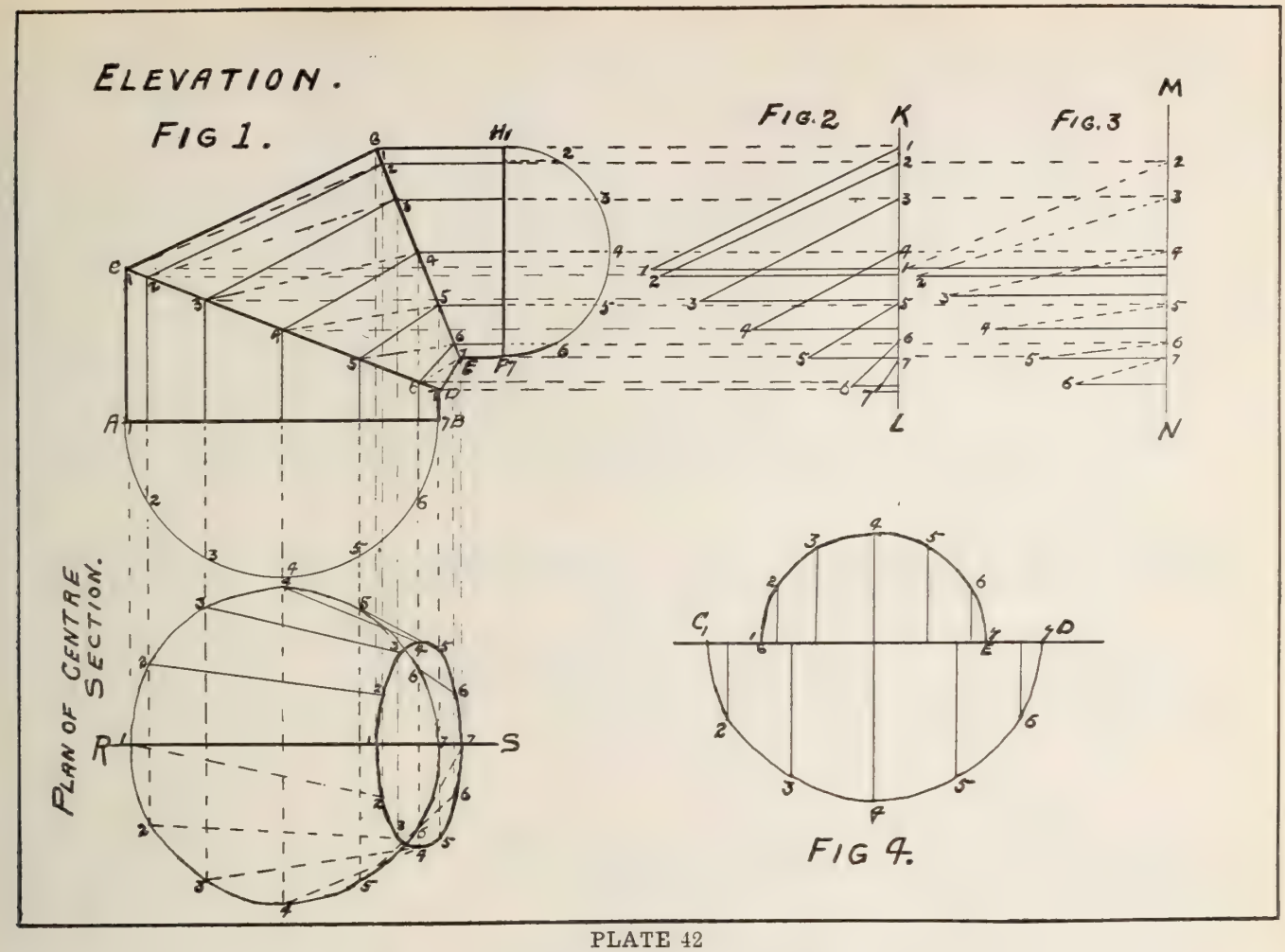


PLATE 42

line from point 5, H-F 6 on line from point 6. H-F 1 and 7 centre lines in plan are on line R-S; a line drawn through the points thus obtained completes plan of centre section C-D, G-E.

On the plan draw solid lines connecting points 1 to 1, 2 to 2, 3 to 3, 4 to 4, 5 to 5, 6 to 6, 7 to 7, the distance from point to point being the base of triangles formed by solid lines on elevation.

With the compasses take distance from points 1 to 1 on plan and mark out from K-L on the line drawn from point 1 on mitre line C-D. Draw a line from point thus obtained to point on K-L drawn from 1 on mitre line G-E. The distance between these two points is the exact length on pattern between points 1-1 of the centre section. Take distance 2-2 on plan and mark out from K-L on the line from point 2 on mitre line C-D. A line drawn from this point to point 2 drawn from mitre line 2 E gives distance between points 2-2 of centre section. Proceed with points 3-3, 4-4, 5-5, 6-6, 7-7 in the same manner.

On the plan draw dotted lines connecting point 1 of large diameter to point 2 of small diameter, 2 to 3, 3 to 4, 4-5, 5-6, 6 to 7. With the compasses take distance from point 1 to point 2 marked by dotted lines, and mark out from M-N on line drawn from point 1 of mitre line C-D. Draw line from point thus obtained to point 2 M-N drawn from mitre line G-E. This gives the exact length between point 1 on C-D to point 2 on G-E. Repeat with 2-3, 3-4, 4-5, 5-6, 6-7, the triangles formed by lines on M-N being the ones formed on dotted lines on elevation.

In Figs. 3 and 4 we have the distance between the two lines C-D and G-E, but before we can draw the pattern we need the shape of elbow on the mitre lines C-D and G-E, in order to get the proper circumference of them on these points. To obtain these proceed by taking a line as C-D on Fig. 4, on which mark the space between 1-2, 2 to 3, 3 to 4, 4 to 5, 5 to 6, 6 to 7 on the mitre line C-D. From these points draw lines at right angles to C-D. On these lines, 1, 2, 3, 4, 5, 6, 7, mark out from C-D the distance from line A-B in elevation to points in half circle, point A in elevation being point C in Fig. 4, from line A-B to point 2 being placed from line C-D on line 2. Repeat with other points. A line drawn through the points thus obtained in Fig. 4 gives a one-half profile or shape of elbow on line C-D. Proceed in a similar manner. The spaces between 1, 2, 3, 4, 5, 6, 7 on profiles in Fig. 4 give the circumference on the lines C-D and G-E.

The two end pieces can be developed in the regular way from elevation. For the pattern of the centre section, proceed as follows on a line as shown, mark off a distance equal to 1-1 in Fig. 2, with the compasses take the distance point 1 to 2 in Fig. 3, and with 1-C of pattern as a centre, strike an arc near point 1 at G-1, with distance from G 1 to 2 in Fig. 4 and G 1 on pattern as a centre strike an arc cutting arc struck from C 1. A dotted line should be drawn from the point obtained to C 1 to keep tab on the work as it proceeds.

With 2-2 in Fig. 2 and with point 2 just obtained as a centre, strike an arc near C 1; with C 1-2 in Fig. 4 and C 1 of pattern as a centre strike an arc cutting one just made; with 2-3 in Fig. 4 as a radius and point 2 just obtained as a centre, strike an arc near point 2 on upper part; with 2-3 on small profile as a radius and point 2, small end, as a centre, strike an arc cutting one just made. Where these meet is point 3 of small end. With this point as a centre and 3-3 of Fig. 2 as a radius, strike an arc near 2 of large end; with 2 of large end as a centre and 2-3 of large profile in Fig. 4 as a radius strike an arc cutting one just made. Where these arcs meet is point 3 of large end. With this point as a centre and 3 to 4 on Fig. 3 as a radius, strike an arc near 3 of small end; with 3 of small end as a centre and

4 of small profile as a radius strike an arc cutting one just made. Where these arcs meet is point 4 of small end. With point 4 just obtained as a centre and 4-4 of Fig. 2 as a radius, strike an arc near point 3 on large end, with point on large end as a centre and 3 to 4 of large profile as a radius, strike an arc cutting one just made. The points where arcs meet is point 4 of large end. With obtained and 4-5 on Fig. 3 as a radius, strike an arc near 4 on small end; with 4 on small end as a centre and 4 to 5 on small profile as a radius, strike an arc cutting one just made. Where arcs meet is point 5 on small end. With point 5 as a centre and 5 to 5, Fig. 2, as a radius, strike an arc near point 4 on large end; with point 4 on large end as a centre and 4 to 5 of large profile as a radius, strike an arc cutting one just made.

Where arcs meet is point 5 of large end. With point 5 just obtained as a centre and 5 to 6 on Fig. 3 as a radius, strike an arc near 5 on small end; with 5 on small end as a centre and 5 to 6 on small profile as radius, strike an arc cutting one just made. Where arcs meet is point 6 on small end. With point 6 just obtained as a centre and 6 to 6 on Fig. 2 as a radius, strike an arc near point 5 on large end; with point 5 on large end as a centre and 5 to 6 on large profile as a radius, strike an arc cutting one just made. Where arcs meet is point 6 on large end. With point 6 on large end as a centre and 6 to 7, Fig. 3, as a radius, strike an arc near point 6 on small end; with point 6 on small end as a centre and 6 to 7 of small profile as a radius, strike an arc cutting one just made. Where arcs meet is point 7 of small end. With point 7 just obtained as a centre and 7 to 7 on Fig. 2 as a radius, strike an arc near point 6 on large end; with point 6 on large end as a centre and 6 to 7 of large profile as a radius, strike an arc cutting one just made. Where arcs meet is point 7 of large end. Draw line from points 1, 2, 3, 4, 5, 6, 7 on each end and from 7 to 7, and we have one-half the pattern. When laying out pattern, if we work from the centre line both ways, as shown on drawing, we have the pattern of centrepiece complete.

Data Relating to Heating Systems

The Time to Study Heating Systems and Their Requirements is When Such Installations Are Being Installed. Many a Splendid System When Being Installed, Has Been Ruined on Account of There Being Very Little Grey Matter Used

By T. W. Reynolds

The overhead pipeless method of heating is known as the "Mills" system, named after J. H. Mills, who first installed it in steam and hot water plants. Perkins in his design of high pressure hot water heating made use of this method, and Peclet mentions this practice as existing in France in 1830. Fig. 5 shows the system applied to a one-pipe steam installation. It is sometimes installed as a two-pipe job, and may have either a dry or a wet return. It is necessary to avoid pockets in the pipe lines where air may collect and prevent circulation.

In the "Mills" system one large riser is carried from the top of the boiler directly to the attic or ceiling of the top storey, from which, at point A (see Fig. 5), a distributing main is carried around the top of the building, always pitching away from point A in the direction of the down feed risers B. Air relief valve should always be placed at the top of each down feed riser as well as on each radiator unit.

This system is simple in construction and is very positive in the circulation of the heating medium. It can be used in almost any type of building, and may be applied to a hot water system (see Fig. 6), provided it is installed as a two-pipe plant. It is more particularly suitable for residences or cottages, or where the basement ceiling is so low that the steam main having but a short rise would lift water from the boiler at a rate sufficiently rapid to maintain

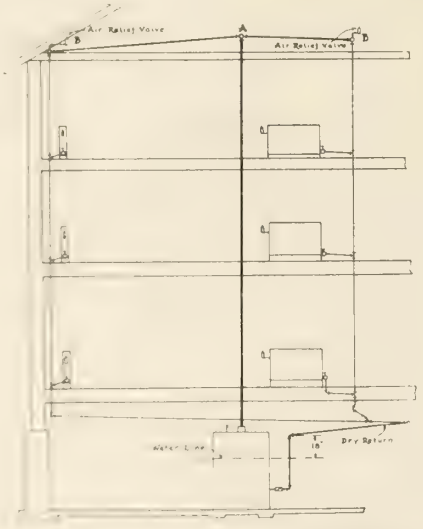


FIG. 5. GRAVITY STEAM ONE PIPE OVERHEAD SYSTEM.

the proper grade below the water line of the boiler.

Fig. 6 shows an overhead system that may use either hot water or steam as a heating medium for transferring heat from the boiler to the rooms. The radiators on each floor when supplied with hot water maintain their own circulation due to their cooling effect. The water cooling descends, and because of its lower temperature, the amount of radiation on the lower floors must be increased to correspond to the decreased heat transmission per square foot of radiation.

It is necessary to provide hot water radiation (in the plant described in Fig. 6) with an air relief valve at the top of each radiator unit. Such a radiator may be used for either steam or hot water, but a steam radiator cannot be used for hot water heating. A steam valve should be placed on the supply end and a check valve on the return end at E of the radiator. A steam radiator valve may replace the check valve, and it is better to have the supply to the radiator enter at a top opening, D. It is necessary to have a boiler fitted with steam trimmings. An expansion tank should be connected at the highest point, A, of the system, and a gate valve provided in the expansion line. The expansion tank is the safety valve of the system, and for this reason the gate valve should never be closed while using the installation as a hot water plant.

One special advantage that the overhead system has over others is the practicability of placing the radiators below the water line of the boiler (shown at C, Fig. 6), a wet return being used. Another advantage is that the steam and condensation both flow in the same direction, consequently the velocities are higher and pipe sizes may be somewhat reduced.

Precautions are necessary in a one-pipe system so as to see that the piping alignment is so correct, and that no sagging occurs as to cause pockets in which water may accumulate and produce hammering. The pipes should be held in position with substantial hangers and due allowance made for proper expansion and contraction. One great advantage of the one-pipe system is that there is only one

valve on each radiator to operate and get out of order, with corresponding economy in first cost and maintenance. There are also fewer unsightly pipes to take up and collect dust or in which leaks may occur.

One Pipe Circuit Hot Water System

Fig. 2 shows a method of installing a one-pipe circuit system of hot water heating. The proper method of installing the piping for this system is to stop the main rather close to the top of the boiler carrying it upward at a slight angle until one or two radiator connections have been taken off, at which point the main should be as close to the ceiling of the basement as possible; and from this point carrying the main downward at a slight angle as far as the last radiator connection. From the point of the last radiator connection the main should pitch rapidly back to the lowest opening in the boiler. In this type of hot water plant the main must be of very ample size to bring about a rapid circulation around the main loop. The amount of hot water received by the last radiators on the circuit will depend on how rapidly the water in the main circulates.

The flow pipes which lead to the radiators should be taken off the top of the main, while the return pipes bringing the water back should be connected into the bottom of the main. This method of making the connections at the main makes it possible to get the hottest water, which is at the top. Short straight runs are essential to the successful operation of this system, as is usually present in residential work, otherwise the mixing of the hot and cold water would be more intimate, which is naturally not to be desired.

One valve for each radiator is all that is required, a union ell being used at the opposite end of the radiator. The radiation on the first floor should have the preference and be supplied direct from the main supply with a direct connection to the main return. The branches nearest the boiler should have the least pitch. Since the hot water has a tendency to rise to the radiators on the highest floors and neglect the lower floors, it becomes necessary to restrict the flow of water by some such method as is shown by the connection F (Fig. 2). In general, this same feature applies to all hot water systems (see Figs. 4, 6, and 7). It is very important to avoid pockets or traps in the pipe lines, which have a tendency to resist the flow of water.

Two-pipe Steam System

In connection with the two-pipe system for steam, it is best to use a wet return. In such a system the supply main, or mains, if more than one be used, is carried vertically above the top of the boiler to the ceiling of the basement or cellar, and then in the direction of the radiators to be supplied. If a dry return

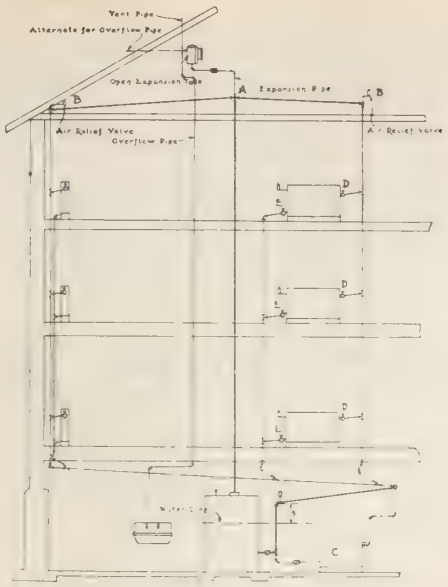


FIG. 6. COMBINED HOT WATER OPEN TANK AND STEAM OVERHEAD SYSTEM.

is used, the end of the supply main should be relieved of its condensation by means of a trapped connection to the return.

Fig. 3 is a diagrammatic representation of a two-pipe gravity system of steam heating. It is advisable, when possible, to carry a return riser from each radiator separately to the return in the cellar and make the connection below the water line of the boiler as the circulation will be more positive and the steam cannot enter the radiators from more than one direction causing water hammer. The diagram shows the common way of installing this system. Two valves are required, one on each of the supply and return ends of all radiators.

The use of a horizontal swing check valve on the return end of each radiator (See A, Fig. 3), and a water trap having a seal of 18-in. to 25-in. at the

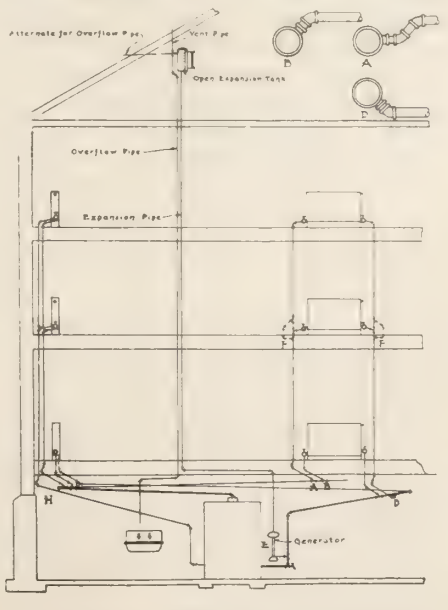


FIG. 7. HOT WATER TWO-PIPE PRESSURE SYSTEM.

end of the main prevents steam from entering the radiators from more than one direction, and also eliminates the necessity of opening or closing more than one valve when a radiator is operated. The water seal should have some provision for cleaning out. A tee at its base with a nipple and cap is sufficient for this purpose. If the ordinary steam valve is used at A (Fig. 3), instead of the check valve, there is a greater liability to water hammer in the radiator, because of condensation being forced back through the return pipe into the radiator. If the check valve is omitted, the hand valve on the return should first be opened or closed when operating the radiator.

"Impulse" Valve on Radiator Return

Mention should also be made of a well-known system which employs weighted swing check valves, or so-called "Impulse" valves on the return end of each radiator. The weight over area of the seat, together with a restricted orifice produce a difference in pressure between the steam and return mains irrespective of the pressure carried. To make this system complete when installed on an ordinary two-pipe installation, there is required one (and one only) main air valve connected to the return mains in the cellar at a point well above the water line in the boiler. All air in the system is expelled through this valve. This system has many advantages such as the elimination of the usual whistling air valve on each radiator together with its first cost, and the graduation of the inlet valve so as to secure a partial heating of the radiator; while the return of water to the radiators is prevented by the ordinary automatic with the use merely of an ordinary gate or globe valve on the inlet end instead of the usual modulating valve. Again, due to it being a closed system there is no limit to the pressure carried except as fixed by the setting of the safety valve. The impulse valves may also be used on indirect stacks and large heating units, such as coils or wall radiation running into several hundred square feet per unit. Such amounts are however seldom encountered in the average residence.

The two-pipe system requires smaller pipes than the one-pipe system of steam work, since, in the former, the steam and water are each carried in different pipes. For this reason there is less chance of trouble from water hammer in the two-pipe work. The same precautions, however, for avoiding pockets in the mains and branches must be observed, and the installation must be as carefully aligned and supported as one-pipe work. The steam should flow through the main in the same direction as the condensation. The minimum allowance for pitch of both supply and return pipes should be one inch in 15 feet.

Two-Pipe Open Tank Hot Water System

Figure 4 shows a two-pipe open tank hot water system. In this there may be more than one supply and one return main, but generally the best results are obtained from one large supply and an equal size return main. The supply and return risers are run in pairs, and each radiator has a supply and return pipe of equal size. The first radiators which are connected to the main nearest the boiler may be retarded in some such way as by making their connections with the mains through a side opening or by adding extra fittings which produce excess friction. As in one-pipe hot water work, only one valve is required for each radiator unit, a union ell being used on the return end. Special precautions must be taken to avoid all unnecessary turns and fittings in the mains. Pockets or depressions should be avoided as they retard or trap the circulation. The best results are obtained where pipes are of full size and installed with a good pitch. The flow main should rise continually from the boiler and the return pipe should be gravity graded toward the boiler.

Should Estimates Be Free?

The Sanitary Engineer Says No, and Reasons Why. Don't Make Your Customers Pay for Service Given to the Other Fellow. The Trade Should Conduct Their Business Upon Sound Principles

SOME three years ago The Sanitary Engineer took up the cry that all estimates should be charged for, and at that time cited cases where time worth far more than the actual cost of certain work, had been wasted in pampering to the public. We heard of a case recently where, when the tenders of which there were 12, were opened, the total cost of the installation was $400. The average time spent per tenderer, including postage, stationery, stenographer sketches and estimates, amounted to $4, which is a fair average, viz., one per cent. At $4 each this amounted to $48. Just 12 per cent. on the job. Now, who paid that 12 per cent. think you? Why the party who got the work done, of course, because the successful tenderer is having to provide for overhead expenditure. He does not necessarily charge or allow 12 per cent. in his overhead expenditure for estimating upon work he never gets, but his salary has to come out of his business, and the time cost, which his salary represents, amounts to a big item, and this time could be put to more lucrative work, thus decreasing his overhead cost.

Further, he would have a greater amount of time to devote in looking after the work he is executing for his regular customers.

He would be better able to manage his business in a business-like manner instead of neglecting the thousand-and-one matters which require personal attention.

If this question of estimating had not become a regular bugbear to the trade no one would resent its being done free of charge.

Another feature of the subject is this: A very large number of architects when requiring plans for buildings send a number of blueprints out to manufacturers of heating appliances to have a set of heating plans prepared. These manufacturers prepare piping plans free, make out a bill of quantities, and in turn take a number of sets of blueprints of the heating system. These are distributed among the heating engineers broadcast; the results are that it is very common to hear of twenty-five heating engineers tendering on one job. The size of the work does not signify. These manufacturers, like the sanitary and heating engineer, are laboring under the same evil conditions. The architect is to blame. He should refuse to ask a manufacturer or engineer to do work of a professional nature unless the client is willing to pay for the work involved.

One Toronto sanitary engineer when asked how business was, replied that he was never so busy in his life tendering on work. When further asked what percentage of this work brought results, he replied about 10 per cent. Which just meant that 90 per cent. was lost time.

The question is this: Why not charge for these estimates? Is there any valid reason why all this time should be given to the public for nothing Is there any reason why all this non-productive labor should exist? Not in the least.

Let us suppose that a store-keeper had to keep clerks on hand to the extent of making one sale in ten. Simply because out of ten persons who came in to ask questions, only one really came to buy. That's what the public are doing with the plumbing and heating trade, and every employer is doing the same when he tenders on ten jobs to get one.

It would not be so dishonest if this extra cost did not require to be paid by the one who gets the work done. Not only so, but 99 per cent. of the tenders accepted are the lowest in price, and in many cases mistakes have been made, material has been omitted, or the work has cost more to do than was expected, and the final result is that a poorer grade of goods are used, or an inferior job all round is installed, with a view of getting out without losing money. Thus the customer pays still further.

It must not, however, be thought that whether the tender is accepted or not, that the person getting the work done, should pay for estimating. But rather that every estimate should be charged for if not accepted.

If a person accepts a tender, then the job should bear the cost. The Sanitary Engineer would like to hear the ideas of its readers on this matter. It is well worth some consideration, and unless the trade make some move to eliminate this evil before more building comes along, there can be no doubt but that besides the employer wasting 90 per cent. of his time, which he should be giving to those of his customers for whom he is doing work, he will have to employ an expert estimator to do the work, and in that way, not only will he be robbing his customers of his service of inspecting work in process of construction, but he also will still further be adding to his overhead expenses.

AN INTERESTING EXCURSION.

The Canadian Gas Association propose holding their annual convention this year in Quebec, August 16 and 17, and arrangements have been made which will enable those who purpose attending the convention to take the trip by boat. Those who join the party at Toronto can procure a special rate of $26.80 return, including berth and meals.

This is surely an exceptional opportunity to spend a most profitable vacation both as regards pleasure and business.

If there be any readers of the Sanitary Engineer who desire to take in this beautiful trip they may procure full particulars from the Secretary, George W. Allen, Consumers Gas Co., Toronto.

New TorontoTechnical School

Specifications Described, Previous Articles Merely Mentioned the Equipment in a General Way—Plans and Layout Will be Described, Making the Following Articles Doubly Interesting

Sanitary Engineering

Heating System.

ALL the air passing through the building is washed and tempered, and in this connection two primary Vento heaters are installed, made up of the Vento type of radiators and built up three tiers high, and are of the regular 50 in. 13.5 sq. foot sections, spaced 5 inches on centres. Each tier is divided into two groups and supplied with steam from each side of the apparatus. As there are 17 sections in each group, 34 in all, and 3 tiers high, the number of sections in each row is 102, making up a heating surface of 1377 square feet per row. With six rows in each primary heater, they contain a total of 8262 square feet of heating surface to each heater.

These heaters are provided with concrete foundations 12 inches high, and the full necessary width to support them from end to end. The radiators are set directly over each other with a 3-16 in. thick steel plate between to form an even bearing surface; the corner sections of course, rest right on the concrete. Each section is tapped 2 inch for feed and return, and as each section was fitted up they were subjected to a water test of 80 lbs. per square inch.

The casing for the above is made of angle iron and No. 14 black iron, bottled true and tight and in such a way as to render it an easy matter to take off the casing if necessary at any time.

The casing is also designed so as to allow a clear two inch space between the rows of vento sections, and is extended to the floor so as to make a light connection to the air washers and cold air duct.

In connection with the cold air ducts, by-pass cold air ducts are furnished to fan side of the reheating coils. These are provided with perfectly balanced dampers set on roller bearings, with 1½ inch angle iron frame.

All these are controlled automatically. The doors are fitted with heavy brass hinges, so as to ensure perfect working and freedom from any possibility of rusting.

Air Washers.

There are two air washers, one in connection with the ventilating outfit just mentioned, the spray heads being of the carrier type. Each washer is capable of cleaning and humidifying 90,000 cubic feet of air per minute, and the velocity at which the air passes through the washer is about 500 feet per minute.

The washer is constructed of No. 18 gauge galvanized iron, the settling tank is built of 18 ounce copper sheet, 16 inches deep and extending the entire length of the washer. The whole casing for these washers is braced with 1½x 1½ angle iron on the inside and approximately 36 inches apart. All the joints are soldered and made perfectly watertight.

Swing doors are fitted to each side of the air washers so as to enable easy access to the spraying chamber, these doors are made up with cast iron frames and glass panels all of which, when closed are water tight.

The spray nozzles are evenly spaced over the cross sections of the washer, and are placed 4 feet away from the eliminator plates. The nozzles, too, are so spaced and regulated as to fill the casing with a very fine spray, making it impossible for any air to pass through without coming in contact with the mist like spray. Each nozzle handles, or rather sprays approximately 200 cubic feet of air per minute.

The eliminator plates are so installed as to deflect the air 5 times during its passing through the washers. The last two or three corrugations of the eliminator plates remove all free moisture. Further, the washer is so arranged that the first three eliminator plates become actual washing surfaces. The nozzles are also arranged so as to maintain a constant sheet of water flowing down these three surfaces continually. The amount of water thus provided is approximately 16 square feet to every 1000 cubic feet of air per minute.

For very humid weather a controlling valve is inserted with the "mist-like" spray nozzles and the washing nozzles only are then in operation.

All piping and fitting in connection with the air washing and air conditioning appliances are galvanized iron, as also is the piping in connection with the settling tanks and pumps.

The washer is provided with a centrifugal pump with brass impellers of the enclosed type, all the stuffing braces and glands being of brass. This pump maintains an even pressure so as to ensure perfect spraying at the nozzles.

The suction and discharge is 4 inches in diameter. It is directly connected with a flexible coupling to a 15 h. p. direct current motor and runs at an approximate speed of 600 R. P. M. The whole, both pump and motor is mounted on one solid bed plate and foundation.

Two large copper strainers made from number 24 mesh copper screen are fitted in the tank which receives the water that is used to re-circulate. The whole apparatus is also fitted with a system of humidity control which will maintain any pre-determined per cent. of humidity under all climatic conditions.

If, for instance, the air outside is charged with 10 per cent. humidity and 35 is needed, the apparatus will furnish the necessary 25 per cent. etc. It is very doubtful if there is a more efficient system of its kind in the Dominion.

High Pressure Piping.

In connection with the high pressure steam lines none but extra heavy pipe and fittings is used. All of which are required to withstand a working pressure of 200 lbs per square inch.

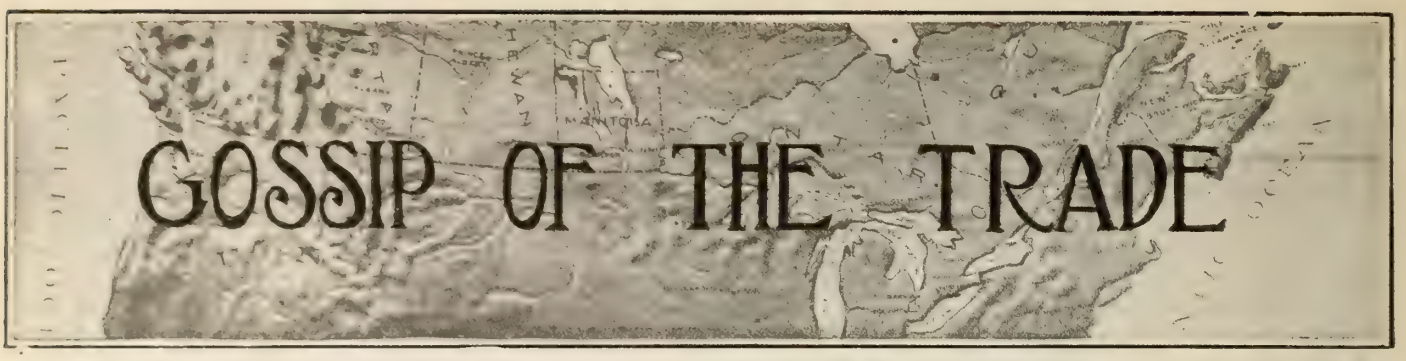
Snow Melting Apparatus.

In each area to the sub-basement an appliance is fitted up for melting snow. This is made up with 1-inch pipe connected with 1½ x 1-inch crosses about 12 inch on centres. These pipes extend the full length of the area and are furnished with 1½ inch steam mains controlled by brass gate valves. All the 1-inch pipes are pitched to ensure easy return of condensed water.

Continued in Next Issue.

SHELLS FOR THE HUN

Though munitions of war are being turned out in hundreds of Canadian factories few but the men actually engaged in the work know anything of the system employed, the process being one of the most closely guarded of war secrets. The veil will be lifted when the Canadian National Exhibition opens on Aug. 26. Permission has been obtained from the War Office, through the Canadian Government, to show the processes of manufacture and several machines, operated by skilled workmen, will be engaged for the two weeks turning out shells and projectiles for delivery to the Huns through the gun muzzles of the Allies.



Local 46 Holds 23rd Annual Picnic

One of the Most Successful Picnics Ever Held—A Big Crowd Attended—Many Employers Also Present

The 23rd annual Excursion and Picnic of the Toronto Local Union 46, Plumbers & Steamfitters, was held Sat., July 22nd, at Beaverton. Between 2 and 3 hundred members and friends boarded a special C. N. R. train, at the Union & Don Stations. When the train passed Rosedale the committee got busy and everybody was supplied with a badge, after which ice cream cones were served freely to all, to the delight of the big and little folk, this kept the committee busy till near the end of the journey.

On arriving at the picnic grounds the male members engaged in a base ball game between picked teams, after which adjournment for dinner was in order. At 2 p. m. the programme of games commenced, and every event was keenly contested, notwithstanding the hot weather. The master's event was an exciting finish, all contestants running very close, until somebody tripped Bob Patterson, by way of a joke. The winners were E. Rockford, 1st; G. F. Frankland, the popular secretary of the D. S. A. Heating Engrs., 2nd., Insp. Trotter, of M. H. Dept., who was coaxed to run, 3rd.

The fitters defeated the plumbers in the tug of war, but the plumbers reversed the decision in a game of indoor ball, which provided much amusement owing to the fact that very few of those playing had ever played before, and perhaps will never play again. Bill Storey created a laugh when he fell in fielding a batted ball. The crowd thought he was swimming for it.

It was now time for supper and the committee soon supplied the necessary liquid refreshments such as milk, tea etc. at the conclusion of the games were adjourned to the lake to the great amusement of several members of L. U. 46 including Bro. Bass, general organizer, gave a life-like imitation of the duck in water. After supper a few fixed up their fishing rods and advertised in unmistakable terms the presence of the finny tribe. Jeff Wood said he had great luck, the fish were just waiting for him to put his line into the water, his total catch was 36 in so many minutes, "some catch."

The train being ready all aboard was called for the return journey, leaving Beaverton about 8.15 p. m., the committee again served ice cream cones, which were appreciated by all and it was a tired and happy crowd that arrived home about 10.45 p. m.

The following programme proved of special interest:—

1. Children's race Prizes for all—Value $10.
2. Girl's race 6 years to 9 years—1st prize, value $1; 2nd prize, value 75c; 3rd prize, value 50c.
3. Boys' race 6 years to 9 years—1st prize, value $1; 2nd prize, value 75c; 3rd prize, value 50c.
4. Girls' race—10 years to 14 years—1st prize, value $1; 2nd prize, value 75c; 3rd prize, value 50c.
5. Boys' race—10 years to 14 years—1st prize, value $1; 2nd prize, value 75c; 3rd prize, value 50c.
6. Married ladies' race—open to all—1st prize, value $2.50; 2nd prize, value $1.50; 3rd prize, value $1.
7. Single ladies' race—open to all—1st prize, value $2.50; 2nd prize, value $1.50; 3rd prize, value $1.
8. Married ladies' race members' wives 1st prize, value $2.50; 2nd prize, value $1.50; 3rd prize, value $1.
9. Three-legged race—open to all—1st prize, value $3; 2nd prize, value $2.
10. Helpers' race 1st prize, value $2.50; 2nd prize, value $1.50; 3rd prize, value $1.
11. 100 yards—married men—Local 46—1st prize, value $2.50; 2nd prize, value $1.50; 3rd prize, value $1.
12. 100 yards single men Local 46—1st prize, value $2.50; 2nd prize, value $1.50; 3rd prize, value $1.
13. Employers' race—1st prize, value $2.50; 2nd prize, value $1.50; 3rd prize, value $1.
14. Egg and spoon race ladies only 1st prize, value $2.50; 2nd prize, value $1.50; 3rd prize, value $1.
15. Open race 100 yards 1st prize, value $2.50; 2nd prize, value $1.50; 3rd prize, value $1.
16. Four-legged race open to all 1st prize, value $2.50; 2nd prize, value $1.50; 3rd prize, value $1.00.
17. Tug of war—Plumbers vs. Steamfitters Individual prizes.

The following proved the winners in above events:

No. 1. All the kiddies.

No. 2—1st, Olive Middleton; 2nd, Alice Bruce; 3rd, I. Thornton.

No. 3—1st, Ross Storey; 2nd, W. McInnis; 3rd, C. Miller.

No. 4—1st, M. Higgins; 2nd, A. Solman; 3rd, I. Hatton.

No. 5—1st, L. Plant; 2nd, S. Jones; 3rd, J. Compson.

No. 6—1st, Mrs. Higgins; 2nd, Mrs. Lent; 3rd, Mrs. Coates.

No. 7.—1st, Miss M. Ward; 2nd, Miss Herring; 3rd, Miss McCurry.

No. 8—1st, Mrs. Larter; 2nd, Mrs. Higgins; 3rd, Mrs. Good.

No. 9—1st, C. Harvey and J. Burt; 2nd, D. Rattray and A. Sawyer.

No. 10—1st, J. Burt; 2nd, J. Ward; 3rd, R. Wedekam.

No. 11—1st, D. Rattray; 2nd, W. J. Russell; 3rd, W. F. Ross.

No. 12—1st, C. Harvey; 2nd, G. Allpeter; 3rd, O. Tribbeck.

No. 13—1st, E. Rockford; 2nd, F. F. Frankland; 3rd, J. Trotter.

No. 14—1st, Mrs. Coates; 2nd, Mrs. Simpson, 3rd, Miss Solman.

No. 15—1st, W. F. Ross; 2nd, Mr. Miller; 3rd, W. J. Russell.

No. 16—1st, Mr. Miller; 2nd, R. Wedekam; 3rd, H. Greyson.

No. 17—Messrs. R. Batt, M. Higgins, A. Colquhoun, D. J. Cruickshank, A. Laster and S. Good.

The committee were as follows:—R. A. Pratt, F. W. Jenkins, M. Higgins, W. Lord, D. B. Rattray, A. Fyfe, W. Thompson, F. J. Terry, J. E. Wood and the congenial W. J. Storey.

J. A. Rattray acted as chairman and T. H. Mosses as secretary.

IN AUTO ACCIDENT

The many friends of Tommy Rich, of the firm of Noble & Rich, London, Ont., will regret to learn that he and a party suffered a serious accident while out motoring a few days ago. At the time of writing we are told all are progressing favorably. The Sanitary Engineer joins the friends of Tom and party on wishing for them a speedy recovery.

A VISITOR FROM AUSTRALIA

It might interest the readers as well as manufacturers in the sanitary and heating trade to know that Mr. Russell M. Crane, of Sydney, Australia, is making a tour of Canada with a view of doing business with Canadian manufacturers. Mr. Crane is representing the firm of G. E. Crane & Sons, manufacturers and importers of all kinds of building material, whose head office and show rooms are situated at 33 and 35 Pitt street, Sydney, Australia.

There may be some manufacturers who desire to export goods to that far distant, yet virile land, and no doubt if Mr. Crane has not called upon them during his stay in Canada any correspondence to his firm will receive prompt attention. The very fact that a concern will send out a representative to look over the ground is proof positive that they are anxious to do business with

Canadian manufacturers. This is to say the least very encouraging. The Sanitary Engineer wishes Mr. Crane every success on this, his important tour and hopes that he may enjoy his return voyage home.—Editor.

CANADIAN GAS ASSOCIATION ELECTS NEW SECRETARY.

It is very doubtful if there is another person in Canada that has taken such an interest in gas, its manufacture, and its utility to the public, as has George W. Allen, Toronto.

Mr. Allen for a number of years was engaged in the electrical business in Brantford, and when natural gas began to be popular in that city, he took up the study of gas and its possibilities. Since then he has been actively engaged in many phases of the gas question and to-day is acknowledged to be one of the greatest authorities we have in Canada upon this most interesting question, if not on this continent. As a lecturer he has become very prominent and his services are being sought from one end of the continent to the other.

His fame and ability for hard work therefore, made him a very desirable person to fill the post as secretary of the Canadian Gas Association, to which position he was recently elected. Mr. Allen is also one of the officials on the staff of the Consumers Gas Co., Toronto, and fulfills the duties of advertising manager.

Speaking to him recently about the sale of gas water heaters in Toronto, he said that during the year 1915, more gas water heaters were sold in Toronto than in any city in the world in one year.

At some future date we hope to publish a series of articles from the pen of Mr. Allen, which will no doubt be of great interest to the trade.

SPRINGS

Consider the surroundings of a spring before assuming that it is safe. If there is no obvious source of contamination and the surroundings would indicate that the water of the spring must have filtered down through thick layers of earth and sand, then the spring is likely to be safe.

In districts like Muskoka and the Kawartha Lakes nature's agencies for purifying water, such as earth and sand, are usually absent or present in small quantity. Moreover, the rocks are cracked and split up in spongy layers and contaminated water may flow a long distance and appear at a low point as a spring. Do not trust such water even if it is clear and bright.

Until you are satisfied by a bacteriological examination, or by an inspection of the source that the water is safe, go on the assumption that it is not safe and boil it or chlorinate it.

In considering the surroundings of a spring, the essential point is the possibility of contamination with human wastes. A nearby manure pile is certainly undesirable, but an outdoor closet is far worse. Remember typhoid fever is a purely human disease.

The Department of Public Health will supply sterilized bottles for the taking of water samples, and will examine specimens of water from the summer residences of Toronto citizens free of all charge.

G. W. ALLEN
Advertising Manager, Consumers' Gas Co. Recently elected Secretary of Canadian Gas Association.

Comment

The above item appeared in a recent issue of the Health Bulletin, and is no doubt of great interest to sanitary engineers.

Those who instal cesspools or other unsanitary contraptions are to some extent responsible for such conditions, simply because they assist in concealing trouble.

WORTH TRYING.

If success you would attain,
In your search for pelf:
And you long for honest gain,
Knuckle down yourself.

Do not trust the other guy,
When it's time to sell or buy,
If you lose, it clears your eye,
Knuckle down yourself.

Your dad's grit won't help you climb,
Or snare the golden elf,
If you hope to own a dime
Knuckle down yourself.

No man yet ere won a name
Resting on another's fame,
If you would be in the game
Knuckle down yourself.

Each one has his load to tote
On this earthly shelf,
Don't make any one your goat,
Knuckle down yourself.

What's the odds if you get stung?
Use it as another rung,
Learn to read the business tongue,
Knuckle down yourself.

—Eva E. Hamilton.

SUMMER RESORT SANITATION OFTEN BAD

The following article, reprinted from the Health Bulletin, Toronto, should be of particular interest to every sanitary engineer in Canada.

He can, if he bestirs himself, do more to dispense with unsanitary surroundings at our summer resorts than any other man. There is money in the work as well as credit of a very commendable nature for those who strive to bring about more sanitary conditions in our country homes. The article reads as follows:

In summer resorts, sanitary conditions around hotels and boarding houses are frequently very unsatisfactory.

Water supplies are not protected and sewage and kitchen wastes are disposed of in a very crude way. Flies usually abound and the methods used in the production of milk are not above suspicion.

When you write away to summer resorts for descriptive literature, inquire what they do in regard to the above matters. You have a right to expect the same protection from your host at a summer hotel as you get from the various civic departments at home in Toronto.

On arrival at your summer resort let your first investigation be the character of the water supply and of the milk supply, how sewage and kitchen waste are disposed of, how food is cared for and ascertain if there are any flies about the kitchen or dining-room.

The very fact that you are interested enough to inquire into such matters will be somewhat of a guarantee that they will have proper attention.

EMPIRE FEDERATION

This will be "Federation Year" at the Canadian National Exhibition and everything has been planned to symbolize Imperial unity and power, the new bonds of Empire brotherhood welded in the crucible of war on distant battlefields. In keeping with the significance of the event plans have been laid for a Spectacle of unusual beauty and brilliance, a superb, satisfying simile of Empire might and cohesion. Over 1,200 performers will be required and they will include soldiers representing all parts of the British domains the world around, from the lathy, dignified Sikh and the big black chiefs of Somaliland to His Majesty's own Brigade of Guards. The pageant will be enacted before a 700-foot reproduction of the British Houses of Parliament, the War Office and Westminster Abbey, all constructed with a wealth and truth of detail such as to almost convince onlookers who have been there that they are back in the "Heart of the Empire."

New Canadian Patents

No. 164,259.

Frank C. Grimn, Cleveland, Ohio, U.S.A., 10th August, 1915; 6 years. Filed 7th February, 1914. Receipt No. 234,438.

Claim.—1. In a water heater, a water container composed of a plurality of sections, each section being provided with an inlet opening and an outlet opening adjacent to each other, by a common wall, said passages communicating at their corresponding ends respectively with the inlet and outlet openings and communicating at their other ends with each other.

2. In a water heater, a water contained composed of a plurality of sections, each section comprising a coil provided with an inlet opening and an outlet opening adjacent to each other, and with two substantially co-extensive passages separated by a common wall and extending through the coil, said passages communicating at their corresponding ends respectively with the inlet and outlet openings and communicating at their other ends with each other.

3. In a water heater, a water container composed of a plurality of sections, each section comprising a coil of general spiral form, the coil being centrally provided with an inlet opening and an outlet opening adjacent to each other, and being provided with two substantially co-extensive passages separated by a common wall and extending through the coil, said passages communicating at their outer ends with each other.

4. In a water heater, a water container composed of a plurality of sections, each section comprising a coil of general spiral form, the coil being provided with an inlet opening and an outlet opening adjacent to, and higher than, the inlet opening, and provided with two substantially co-extensive passages separated by a common wall and extending through the coil, said passages communicating at their corresponding ends respectively with the inlet and outlet openings and communicating at their other ends with each other, the one passage rising gradually from the inlet opening to its other end and the other passage rising gradually from its corresponding end to the outlet opening.

5. In a water heater, a water container composed of a plurality of sections, each section comprising a coil of general spiral form having spaces between its successive convolutions, the coil being centrally provided with an inlet opening and with an outlet opening adjacent to, and higher than, the inlet opening, and being provided with two substantially co-extensive passages separated by a common wall and extending through the coil, said passages communicating at their inner ends respectively with inlet and outlet openings and communicating at their outer ends with each other, the one passage rising gradually from the inlet opening to its outer end, and the other passage rising gradually from its outer end to the outlet opening.

No. 164,696

Thomas Alexander Wallace, Regina, Saskatchewan, Canada, 31st August, 1915; 6 years. Filed 16th June, 1915. Receipt No. 252,921.

Claim.—1. The combination with a range boiler having an inlet orifice and a pipe extending upwardly therefrom, of a feed spout located above the open end of the pipe, a valve closure for the lower end of the feed spout, and a cover for the feed spout designed to automatically carry the valve into the closed position when in engagement with the feed spout

2. The combination with a range boiler provided with the usual return orifice and pipe extending from the return orifice, of a fed spout located vertically above such orifice and provided with a valve seat at its lower end, an exterior threaded portion extending outwardly from the feed spout, a valve co-acting with the valve seat, a cap extending over the upper end of the feed spout and provided with an internal thread engaging the aforesaid external thread, and means operated by the cap for forcing the valve into the closed position when it is screwed into place.

3. The combination with a range boiler provided with the usual return orifice and pipe extending from the return orifice, of a feed spout located vertically above such orifice and provided with a valve seat at its lower end, an exterior threaded portion extending outwardly from the feed spout, a valve co-acting with the valve seat, a lever pivotally mounted upon the upper end of the feed spout, a link connected at its upper end to the lever and extending through the feed spout and connected at its lower end to the valve, and an internally threaded cap engaging the exterior threaded portion and designed to engage the lever to carry the valve on to its seat as the cap is screwed into position.

4. The combination with a range boiler provided with the usual return orifice and pipe extending from the return orifice, of a feed spout located vertically above such orifice and provided with a valve seat at its lower end, an exterior threaded portion extending outwardly from the feed spout, a valve co-acting with the valve seat, a lever pivotally mounted upon the upper end of the feed spout and connected at its inner end to the valve, a cap provided with an interior threaded portion designed to engage the exterior thread of the feed spout and with an inwardly upwardly extending tapered portion designed to engage the outwardly extending arm of the lever to force such arm downwardly as the cap is screwed into position and the valve against its seat.

No. 164,608.

Albert J. Coburn and Fronk Hardie, co-inventors, both of New Orleans, Louisiana, U.S.A., 31st August, 1915; 6 years. Filed 29th October, 1915. Receipt No. 251,196.

Claim.—In a flushing apparatus, the combination of a tank, an upright pipe fixed therein and adapted to lead water downwardly therefrom, a vertically movable casing surrounding the pipe and having an apertured bottom and also having a flange on said bottom surrounding the pipe, a tension wire arranged in said flange and engaging said pipe, a conduit connected with the upper end of the casing and extending laterally and then downwardly and open at its lower end to the interior of the tank, upright rods grouped about the pipe and extending between and connected with the bottom of the casing and the upper portion thereof, an annular stop fixed to said pipe and spaced above the bottom of the casing, a valve plate surrounding the pipe and movable vertically between the bottom of the casing and the annular stop and independently of the casing, and suitable means for raising the casing.

No. 165,831.

Nicholas U. Peris, Landisville, Pennsylvania, U.S.A., 2nd November, 1915; 6 years. Filed 6th May, 1915. Receipt No. 251,471.

Claim.—A water heater and radiator comprising a cylindrical casing having inlet and outlet openings to admit and exhaust the heating medium, an annular plate secured within the casing and forming therewith a circumferential heating chamber adapted to receive the heating medium, said annular plate and the side walls of the casing providing the water reservoir, inlet and outlet pipes for the reservoir, and a plurality of diagonally disposed and open ended tubes passing through the reservoir and secured to the side walls of the casing, said tubes adapted to have air currents pass therethrough, substantially as set forth.

(Continued on page 34.)

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

WHAT IS REALLY A VACUUM?

Editor The Sanitary Engineer—I would like to encroach a little upon your time by asking a few questions about a vacuum and how vacuums are set up, or applied. I have heard of gauge boilers collapsing, as well as steam boilers, and cannot figure out how a boiler which would stand a working pressure of steam as high as 75 to 100 lbs. could be made to collapse. Then there is the question of vacuum steam heating. If it is dangerous on the one hand, how can it be safe in another? I believe you could explain in a simple manner these questions, and therefore, would like to read in some future issue, some explanation of the vacuum.

A. R. R.

It would be difficult to find a question of more vital importance to sanitary and heating engineers than that of the vacuum. We will, therefore, touch upon the subject from a few standpoints. To answer the question "What is a vacuum?" would be simply to say, "A vacuum is a space void of air," but such an answer would not necessarily be an explanation.

There are many ways of forming or creating a vacuum, by pumping, by contraction, by condensation of steam or air to liquid, or by cooling dry hot air, which, of course, would result in condensation. But first of all before taking up the question of vacuum, some slight mention should be made of atmospheric pressure.

All bodies on this earth are subject to a pressure of 14.7 lbs. per square inch. At sea level, now, let us suppose that a vacuum is required. Some quantity of this air must first be surrounded by a vessel or receptacle which consists of a greater specific gravity than air, and which also is able to withstand more inside or outside pressure than 14.7 lbs. per square inch.

The writer once attended a series of lectures on physics, and one of the best illustrations of the power of a Vacuum, as well as the solidity of air was given in the following manner:

A large glass jar was procured, and a piece of thick sheet elastic. The latter was clamped and stretched tightly over the mouth of the jar and a round 56 lb. weight placed on top of the elastic. This weight made a very slight convection on the elastic. At a small outlet at the bottom of the jar a small pump was attached, and the air was pumped out, at each stroke the weight began to lower until it nearly reached the bottom of the jar. This, the lecturer explained, showed that air is a solid, and that the 14.7 lbs. pressure per square inch which is being exerted upon all life substance on earth, is really a solid which keeps such substances on to the face of the earth.

The lecturer then allowed the air to return back into the jar and suddenly the weight began to rise until it reached its former position. This illustration not only showed the power of enclosed air, but also the power of a vacuum.

In connection with the power of a vacuum caused by the condensation of steam the following physical action takes place. The air is driven from the space which the steam occupies, whether enclosed or not, and this requires that an absolute pressure of 14.7 lbs. has been displaced. Now, suppose we take an airtight vessel, one cubic foot square, insert an air valve, and put a little more than one cubic inch of water into the vessel, apply heat so as to transform all the water into steam, allow all the air to escape and close off the air valve tight. Place this vessel on a block of ice, what will happen? If the vessel is only just strong enough to withstand a few lbs. pressure, it will in all probability collapse under a vacuum caused by the steam condensing. There is no pressure at all, no air on the inside, but, a displacement will be observed by the collapsing, that is the cubic area taken up by the vessel, will now be less than 1 cubic foot.

Referring to the question as to why vacuum heating systems appear to to safe when great damage has resulted from a vacuum, it is just a question of steam pressure on the one hand, and vapor steam on the other. If any heating specialty man were to advocate high pressures, and direct vacuum from those pressures, it would not be safe, but they do not, they depend very largely upon a vacuum being created from vapor. But the reader must not lose sight of the fact that even vapor steam is really an atmosphere, which is resisting a 14.7 lbs. pressure per square inch. This means that even vapor steam is really water expanded 1728 times its original volume and the vacuum in steam heating systems is set up between these points 1728 to anything less. Some years ago the writer installed a small one pipe dry return steam heating system upon a certain evening while one of the radiators was very hot, an air valve was opened and a slight Vacuum was observed. This appeared to be strange, but upon investigating to find out the cause, it was found that when the system was working O. K. every radiator doing service, and condensation returning evenly, that the water in the vertical piece of pipe was 6 inches higher than the water line in the boiler. This was proved by inserting a pair of water gauge cocks and glass in the pipe mentioned .

This little description shows the power of a small column of water, which caused a sufficient Vacuum to operate a steam system, of course, the experiment, for such it really was, could not be termed of any great value so as to be able to adopt such a system in a general way. But without doubt the Vacu-Vapor, or any form of vacuum steam heating system is going to prove a boon to the people. It might be claimed that in the science heating, the creation of a vacuum by condensation, and utilizing such vacuum in heating systems is one of the greatest advances in science made in this 20th century.

Editor.

IRON IN WATER

Iron can be detected in water by taste when there is one-half unit of it to a million units of water, and more than four or five units would make the water unpalatable. In some mineral springs iron is the constituent that gives the water its medicinal value, but ordinarily it is undesirable. If more than two and five-tenths units in the million are present in the water that the laundress uses for laundering, the clothes will be stained. If more than two or three units in the million are in the water that the paper maker uses, his paper will be stained. The ice made from water that contains iron is cloudy and discolored. If much iron is in the water that the engineer uses for making steam it will do harm, for it contains acids that, when set free in the boiler, corrode the boiler plates. The amount of iron carried in solution by most water is, however, so small that the damage it does to steam boilers is generally not great. Water with a good deal of iron in it has in many instances caused great trouble and expense in city waterworks, for iron so favors the growth of Crenothrix, a musty, stringy bacteria, that the pipes every little while become clogged with it.—Ex-

WHERE SERVICE TALK PAYS

After all the man who is sold on the service appeal, especially in the matter of automatic gas water heaters, is more satisfactorily sold than he who is sold on the appeal of price alone.

While it is true that water can be heated cheaply by gas, and under most conditions more cheaply than by any other method, still the great point in favor of gas heated water is its convenience and its up-to-dateness.

Imagine trying to sell a Packard on a price appeal. People buy automobiles, rugs, statuary, books and paintings, because these things contribute to their aesthetic sense, their comfort, their culture, their refinement. If the low price at which water can be heated by gas [illegible] to recommend it, automatic gas water heaters would be a minus quantity. The thing that has sold gas water heaters from the beginning is the idea of service. The prospect naturally pictures in his mind the advantages of gas heated water. He pictures the disadvantages of the other methods and this, it seems certain, is the big thing to talk about to the water heater prospect.

In selling water heaters to the consumer- the man who uses them, it is well to bear this big point in mind. Price, of course, is important to be borne in mind of course, but the key-note is SERVICE.

GAS THE 365-DAY FUEL

(The Pilot.)

The Detroit Free Press, in a recent issue, goes so far as to advocate the flat rate for water in order to get rid of water meters to avoid the danger of explosion by reason of overheating of water by furnace coils.

We do not desire to enter into a discussion of the justice or injustice of the flat rate plan except to say that, on the face of it, it would seem more equitable from every standpoint if users of water paid for the actual water they used.

The point we want to make is that the best way to avoid the expense of taking out the meters already installed is to adopt a plan which will remedy the trouble complained of at the source.

The trouble seems to be that furnace coils generate steam which cannot expand into the mains because of the check valve effect of the water meter. Failing to find an outlet into the mains, the storage tanks give way and explosions result.

IF

If you know a story bad,
About the other fellow;
If you think he is a cad,
With a streak of yellow.

If his business plans disclose
Crooked deals, surprising.
If he proves by shabby clothes,
Lack of advertising.

If you feel the world would be
Better far, without him;
If in smartness you can see
All the faults about him.

Tell me now, as man to man,
Which would be a kindness?
Spying on him all you can,
Or merely practise blindness.

Do you think you stand to gain,
If you slam another?
Is he foolish, weak or vain?
Still, he is your brother.

Run your own biz. on the square.
Boost in place of knocking.
Living straight will help him care,
Act—instead of talking.

—Eva E. Hamilton.

In the first place the furnace coil is a delusion. It is supposed to provide hot water without additional cost, because the furnace fire is going anyway, but as we have repeatedly said, every heat unit which goes into the water supply is taken from the rooms. It simply means burning just that much more coal.

And on top of all that, the hot water supply is not uniform even in winter when the furnace is going full blast. In the spring and fall when a low fire only is run, you simply do not get hot water. All you get is tepid, insipid water, neither hot nor cold, and unless you have a gas water heater in connection with your storage tank, it means no hot water .

The best way to solve the difficulty would be to make a campaign to take out the furnace coils. They are no good anyway.

Educate people to heat water with gas. It is the cheapest, best, cleanest, most dependable, most sensible, most all-round-satisfactory way. And if we had more room, we could think of a whole lot of other adjectives which would fit the case. There are reasonable profits gained by the sale of gas water heaters and they are an all-year-round convenience a real "comfort on tap 24 hours a day, 365 days a year."

Gas is the 365-day fuel for cooking and for water heating.

NEW HOLE BORER.

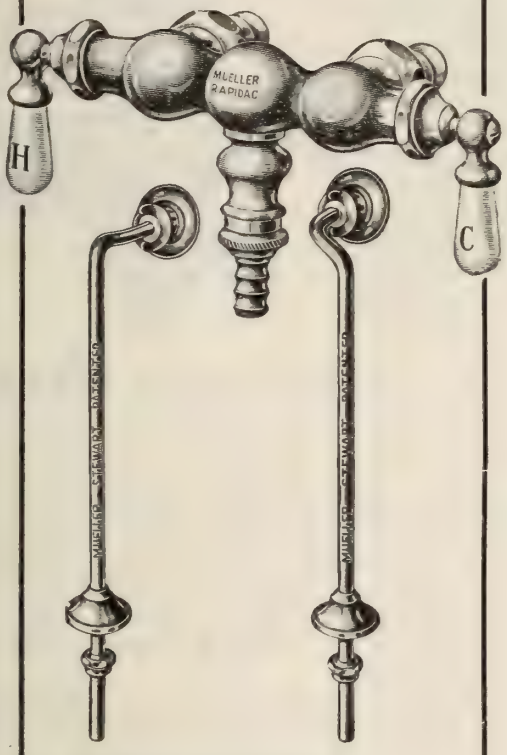
To those who have had holes to drill in concrete, brick or stone, the new tool just placed upon the market by Daugherty-Smith-Phillips Co. will be thoroughly appreciated. This company make some very novel claims for their tool, which is known as the "Phillips spring hammer and drill.' The hammer operates very much like a regular breast drill, has two

The New Wall Boring Tool

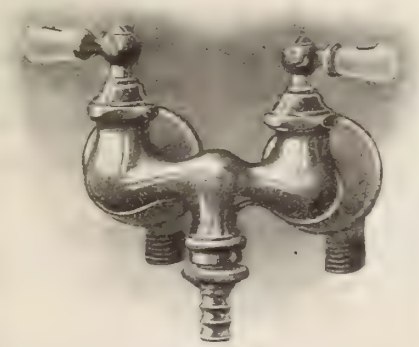
handles and mechanism which delivers 1,500 blows per minute; the company claims, too, that each blow is just as effective as the average blow given with a hand hammer and chisel. Providing these claims can be lived up to the tool has a great deal to commend itself to sanitary and heating engineers. Full particulars, prices, etc., may be procured from the above firm. Address 500-502 W. Division St., Chicago, Ill.

INCREASED METAL OUTPUT

Nickel and copper from Sudbury have made an output record for the first three months of this year 50 per cent. greater than for the corresponding period a year ago. That compromise with the mining tax law will scarcely survive



**Fuller in Design—
Compression in Action**



Two Designs in

MUELLER Rapidac

THE MORE YOU KNOW
ABOUT BRASS GOODS
THE BETTER YOU LIKE

The Mueller Line

One of our customers said:

"My father and I have been in the plumbing business over 25 years and our biggest losses have been caused by troubles with inferior brass goods.

"We are building up a splendid business on quality brass goods. Every dollar we spend with Mueller's is like putting money into the bank with compound interest.

"WE NEVER HAVE TO GO BACK TO REPAIR MUELLER RAPIDACS."

The Mueller Line costs a little more than the ordinary ones — but you buy more quality and more satisfaction.

Sold by all jobbers throughout the Dominion.

H. Mueller Manufacturing Co., Limited

SARNIA, ONTARIO

(Continued from page 30.)

No. 164,112

Samuel Davies, Edmonton, Alberta, Canada, 3rd August, 1915; 6 years. Filed 6th February, 1915. Receipt No. 247,755.

Claim.—1. A soldering iron comprising a stem offset at the lower end, and an adjustable head mounted therein.

2. A soldering iron comprising a head having a recess therein, conduits leading from the said recess to the point of the iron and a detachable cover mounted in the said recess adapted to form a reservoir therewith.

3. A soldering iron comprising a head having a threaded projection on the upper end, a stem having a threaded recess at the lower end and a male and female coupling adapted to secure the said head and stem together.

4. A soldering iron comprising a head having a recess therein, such recess being provided with longitudinal corrugations in the bottom thereof, conduits extending from the said recess to the lower end of the said head, a cover mounted in the said recess adapted to form a reservoir therewith, a set screw adapted to secure the said cover in position, a stem, and a coupling adapted to secure the said stem to the said head.

5. A soldering iron comprising a head having a recess therein provided with a bottom sloping backwardly from the point of the iron, conduits heading from the said recess to the point of the iron, and a cover mounted in the said recess adapted to form a reservoir therein.

FLEET OF VESSELS VICTIMS OF MINES

The ever-present perils which must be faced and circumvented by the British Navy when scouring the broad bosom of the sea for a glimpse of the Hun vessel sneaking furtitively about, hiding itself under water or sowing treacherous death [illegible] will be vividly pictured at the Canadian National Exhibition. Hidden mines, torpedo attacks and desperate onslaughts by the aerial corps will each afternoon threaten a sturdy ship of war, which will eventually succumb to the murderous action of an [illegible] sea mine, the magazine exploding [illegible] a deafening crash, throwing tons of water and wreckage high in the air. Surrounding mines will explode at intervals while the land batteries and anti [illegible] guns devote their energies to the [illegible] airmen, who are hovering [illegible] endeavoring to drop their explosive cargoes on a vital spot. It will be a picture of war never excelled at the Canadian National.

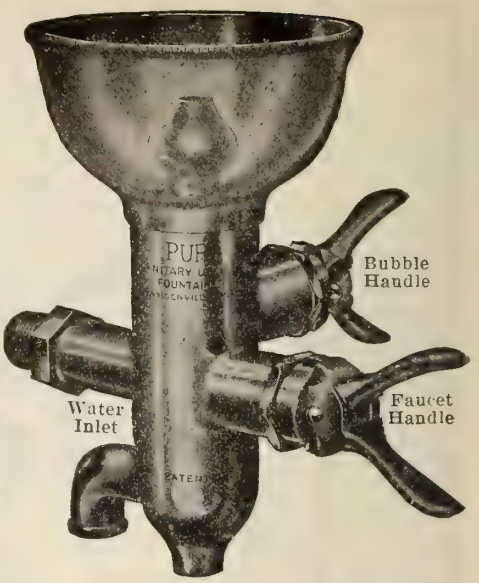
STANDARD-IDEAL SALE.

Negotiations Not Complete According To L. M. Wood.

In connection with the report in a Toronto daily paper to the effect that negotiations had been completed for the purchase of the Standard-Ideal Company by L. M. Wood, president of the Standard Chemical Company, W. D. Ross and Cluff Brothers, The Post learned on Friday afternoon that the deal had not as yet been concluded. Mr. Wood stated that he was conducting negotiations for the purchase of the plant and intimated that the outlook was that he would succeed in securing it for the interests he represented. The property was offered by public auction last week but the reserve bid was not reached. Report says that the interests negotiation propose to use the plant for the manufacture of munitions.

THE SECRET OF SUCCESS

The secret of success is not a secret. Nor is it something new. Nor is it something hard to secure. To become more successful, become more efficient. Do little things better. So work that you will require less supervision. The less supervision is needed by the person who makes the fewest mistakes. Do what you can do and should do for the institution for which you are working, and do it in the right way, and the size of your income will take care of itself. Let your aim ever be to better the work you are doing. But remember always that you cannot better the work you are doing without bettering yourself. The thoughts that you think, the words that you speak, and the deeds you perform are making you either better or worse.—By Thomas Drier.



Saving or Wasting?

The manner in which you handle the drinking water problem in your plant may seem to be a small matter to you—but investigate. The results will be surprising.

The old-time faucet is costly. Running hour after hour, day after day, its ceaseless flow is costing you money, yet without any better service.

Puro Saves 35%

A Puro Sanitary Drinking Fountain will cut that water bill 35%. We can prove that it has done that for others.

It will give every employee a safe, saner draught of bubbling water free from the contamination of the common drinking cup.

In a word, it is the only sanitary Drinking Fountain that is really safe, sanitary, simple, automatic in control, and easy to attach.

"PURO-FY"

(MADE IN CANADA)
YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company
147 University Ave., Toronto, Canada

The Money Market

General Business Conditions, Real Estate, Bond and Stock Developments

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THE FINANCIAL POST OF CANADA

The service of The Post's Investor's Information Bureau is free to subscribers.

Write for Sample Copy. Published Saturdays. $3.00 per annum.

THE FINANCIAL POST OF CANADA
"The Canadian Newspaper for Investors"
TORONTO, CANADA

The Distant Control

The "STACK"
Distant Control System

gives control of the water heater from any part of the house.

It is an attachment (supplied with the Stack Heater) that enables you to light the gas from your kitchen or bathroom or bedroom, even if the heater is located in the basement. If you are downstairs (at the heater) and want hot water for the laundry or any household purpose, turn on the control at that point, and the heater is instantly in operation.

IT FILLS A LONG-FELT WANT FOR A LOW-PRICED AUTOMATIC CONTROL AND FOR THIS REASON IT WILL BE IN BIG DEMAND.

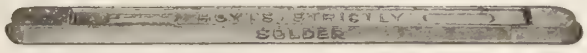
Stack Water Heaters

Are guaranteed to produce more hot water for a given quantity of gas, and to last longer than any other copper coil heater of equal capacity made.

Drop a line for full details.

James Morrison Brass Mfg. Co., LIMITED
93-97 Adelaide Street West, TORONTO

Our Mixed Metal Sales Amount to Over $5,000,000 Annually

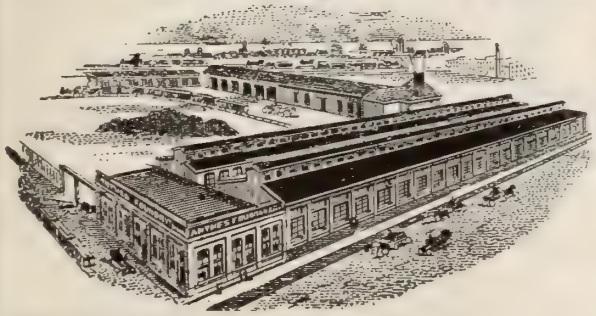


HOYT'S WIPING SOLDER is as perfect as experience and first class ingredients can make it. As only one perfect Wiping Solder can be made we manufacture only one grade, which must necessarily be Hoyt's high standard of quality.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends. Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO
New York, N. Y.; London, Eng.; St. Louis, Mo.

TORONTO **ANTHES FOUNDRY LIMITED** WINNIPEG



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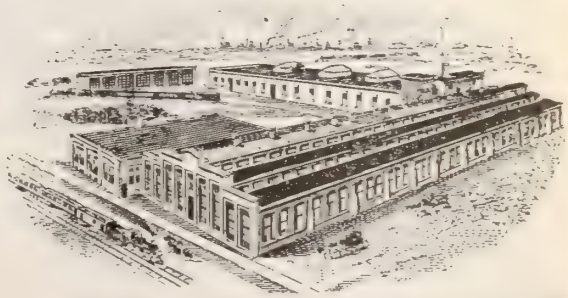
CAST IRON SOIL PIPE AND FITTINGS



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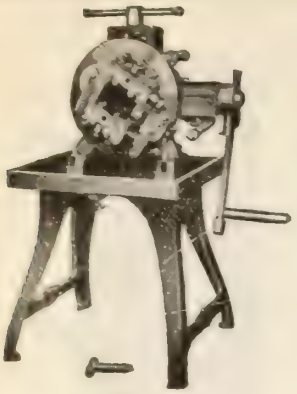


No. 00

PIPE MACHINES

Either Hand or Power

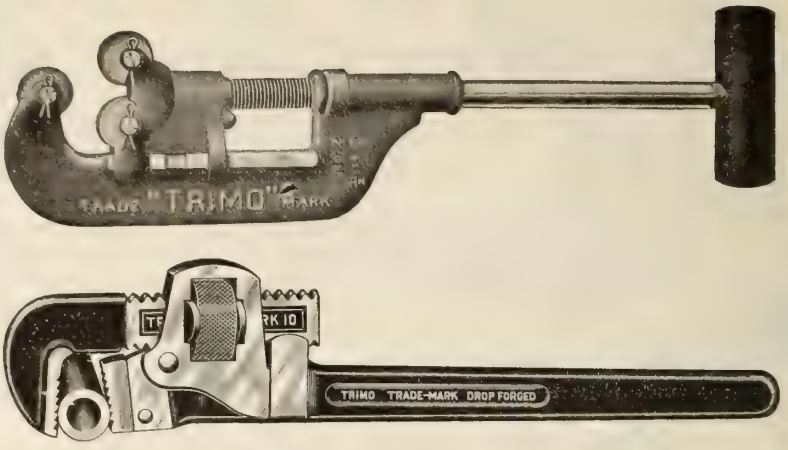
This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
A time and labor saving machine.

Manufactured by

THE ARMSTRONG MFG. CO.
317 Knowlton Street
BRIDGEPORT, CONN.
WRITE FOR CATALOGUE

World-Famed Specimens of the Age of Steel

TRIMO



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H. L. SEYMOUR, B.A.Sc., A.M. Can. Soc. C.E. Box 95 Sanitary Engineer TORONTO - ONTARIO

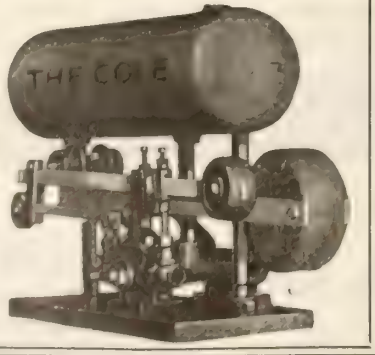
R. O. Wynne-Roberts

Consulting Sanitary Engineer

310 TEMPLE BUILDING, BAY STREET TORONTO

Water Supply, Sewerage, Sewage Disposal of Cities, Villages and Institutions.

THE "COLE" FOR COAL ECONOMY

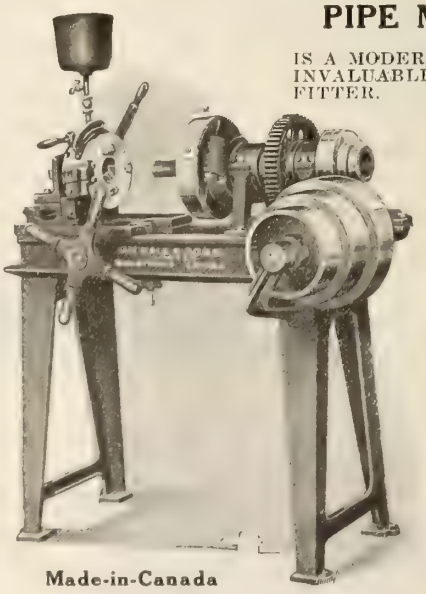


GEO. W. COLE CO.
838 Dundas St. TORONTO

Save TIME and PIPE and CUT TRUE THREADS

THE HALL NO. 2 PIPE MACHINE

IS A MODERN TOOL THAT IS INVALUABLE TO THE PIPE FITTER.



Made-in-Canada

Built in Canada for a maximum amount of accurate and efficient service to Canadians, and they cost less than imported machines.

Capacity, ¼-in. to 2-in. pipe. Nipples, ¼-in. to 2-in. Bolts, ⅜-in. to 1½-in. Hand, Belt or Motor drive.

Only one of the many sizes manufactured by us.

Ask the user about Hall machines — we'll gladly furnish you with names.

Prompt delivery from stock.

JOHN H. HALL & SONS, Limited
BRANTFORD, CANADA

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"When writing advertisers please mention that you saw their advertisement in the SANITARY ENGINEER."

Making Condensation Pay

TO OPERATE a steam plant at the greatest efficiency, every available unit of energy must, of course, be extracted from the steam. So much attention has been given to the "Expansive energy" qualities of steam that the latent possibilities of **condensed steam** have been almost overlooked.

Condensation, properly handled, has a **big** money value. With the

Morehead Back to Boiler SYSTEM

condensation can be returned **under pressure** instantly and automatically to the boiler as pure, hot feed water.

The economies are manifold:

The thermal efficiency of steam heated equipment is raised to a maximum degree.

Fuel in amount of from 5 to 20 tons saved per day. Boiler capacity and life are increased to a surprising extent through the use of the chemically pure, hot condensation as feed water.

Send coupon for full information.

Did you ever stop to think that—

while at temperatures below 212° F. it requires only one calorie of heat to raise one pound of steam 1° F.—at 212° F. 535 calories are consumed without even raising the temperature.

Cooling condensation for pump feed entails the **loss** of 535 calories for every pound of water.

Moral: Use the "Morehead System."

TELL ME THE REST

Name _____
Company _____
Address _____
Position _____

Canadian Morehead Mfg. Co.

Woodstock **Dept. "C"** **Ontario**

B-O-T CLOSETS

Guaranteed Five Years.

Look for the Trade-Mark.

TRADE B.O.T. MARK

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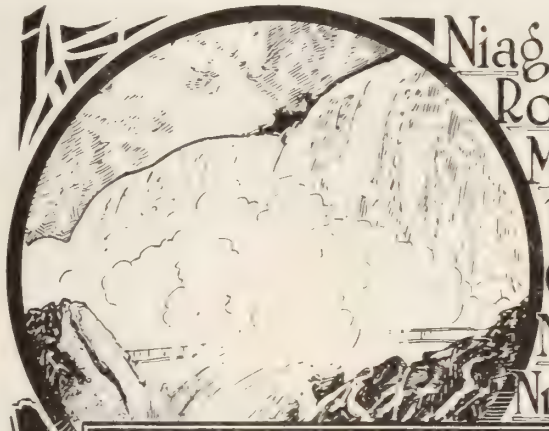

Niagara's Roar a Marvel: Your Closet Noise a Nuisance.

QUATURN BALL COCKS ROAR NOT!

Neither do they Sing nor Whistle: but Quietly and Quickly Fill the Closet tank as oft as Emptied. Ask Your Jobber to fit Your New Tanks this Year with "The Quaturn Silent Ball Cock".

Wallaceburg Brass & Iron Mfg Co
WALLACEBURG · LIMITED · ONTARIO

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Air Valves.
Canadian Wolverine Co., Ltd., Chatham.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
Jenkins Bros., Ltd., Montreal.
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James Morrison Brass Mfg. Co., Toronto.
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Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.
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Canada Metal Co., Ltd., Toronto.
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Canada Metal Co., Ltd., Toronto.
Cluff Mfg. Co., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
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H. L. Seymour
R. O. Wynne-Roberts, Toronto.

Country Residence Equipments.
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Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Limited, Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Damper Regulators.
Canada Metal Co., Ltd., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Drainage Fittings.
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Puro Sanitary Drinking Fountain Co., West Toronto.

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James Morrison Brass Mfg. Co., Toronto.
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Darling Bros., Ltd., Montreal.
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Enamelware
Amherst Foundry Co., Amherst, N.S.
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Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
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Mixing Valves.
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H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
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Monkey Wrenches.
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Canadian Tube & Iron Co., Ltd., Montreal.
Lord & Burnham Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Warden King, Ltd., Montreal.

Pipe Cutters.
Trimont Mfg. Co., Roxbury, Mass.

Pipe Joint Compounds.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

Pipe, Soil, and Fititngs.
Anthes Foundry Co., Toronto and Winnipeg.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Warden King, Ltd., Montreal.

Pipe Threading Tools and Machinery.
Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.
A. B. Jardine & Co., Hespeler.

Pipe Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Porcelain Ware.
Canada Metal Co., Ltd., Toronto.
Amherst Foundry Co., Amherst, N.S.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Pumps.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
Galt Brass Co., Limited.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Radiators.
Lord & Burnham Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., New Britain, Conn., U.S.A.

Radiator Traps (Steam).
Canada Metal Co., Ltd., Toronto.
W. E. Clark & Co., Ltd., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Reducing Pressure Valves.
Canada Metal Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Septic Tank Valves and Syphons.
Anthes Foundry Co., Ltd., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
West Toronto Foundry Co., West Toronto.

Solder.
Canada Metal Co., Ltd., Toronto.
Hoyt Metal Co., Toronto.

Steam Specialties.
W. E. Clark & Co., Ltd., Toronto.
Darling Bros., Ltd., Montreal.
Dart Union Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Wabash, Ind.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville, Ont.

Steam Traps.
Canadian Morehead Co., Ltd., Woodstock.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Geo. W. Cole Co., Toronto.

Smoke Test Machines.
James Morrison Brass Mfg. Co., Toronto.

Tanks, Steel and Wood
Ontario Wind Engine & Pump Co., Toronto.

Temperature Boosters
W. E. Clark & Co., Toronto.

Testing Plugs.
James Morrison Brass Mfg. Co., Toronto.

Tools.
Armstrong Mfg. Co., Bridgeport, Conn.
Canadian Wolverine Co., Ltd., Chatham.
Hall & Sons, Ltd., Brantford.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Nicholson File Co., Port Hope, Ont.
Williams, J. H., & Co., Brooklyn, N.Y.

Unions.
Canada Metal Co., Ltd., Toronto.
Dart Union Co., Ltd., Toronto.

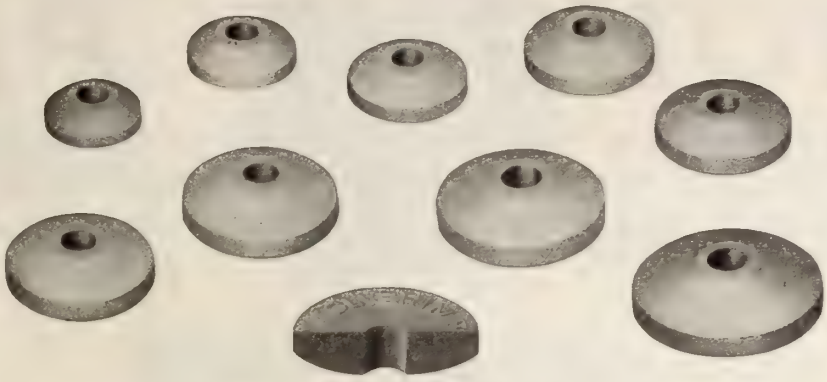
Vapor Heating Systems.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
W. E. Clark & Co., Ltd., Toronto.

Vitro Tanks
Cluff Mfg. Co., Toronto.

Vacuum Systems of Heating.
W. E. Clark & Co., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Water Supply Systems.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Darling Bros., Ltd., Montreal.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Note Number of Sizes in Stock



A Size for every Need

Wolverine Tapered Bibb Washers

The ROUNDED TAPER will more readily fit imperfect seats. Will not crumble or flatten out.

Compounded from asbestos and rubber making a washer which is equally as satisfactory on hot as cold water.

Send for a sample package of

Wolverine Bibb Washers and Fuller Balls.

ONCE TRIED—ALWAYS USED

Canadian Wolverine Co., Ltd. **Chatham, Ont.**

ALPHABETICAL LIST OF ADVERTISERS

Occasionally advertisements are inserted in the paper after the index has been printed. The insertion of the Advertiser's name in this index is not part of the advertising order. The index is inserted solely for the convenience of the readers of the paper.

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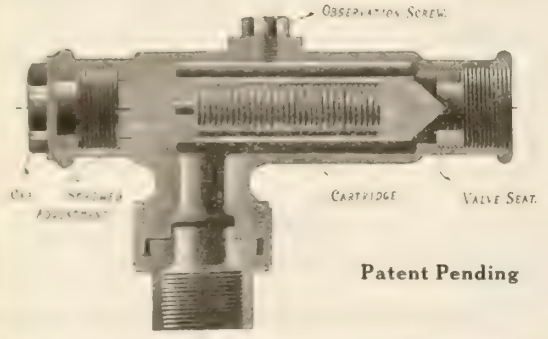
WROUGHT PIPE

BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED
Montreal Works: Lachine, Can.



Patent Pending

The "WELO" Trap is guaranteed to pass air or water freely, but to shut off against steam.

"WELO" TRAPS

For High and Low Pressure Steam, Vacuum or Vapor Heating.

Made in Canada
BY

VICI RADIATOR COMPANY
HAMILTON, ONTARIO

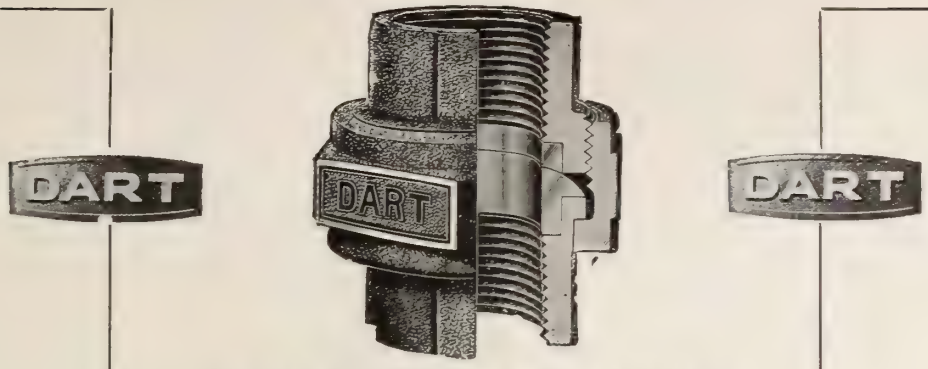
STEAM AND HOT WATER HEATING

BY H. C LINCOLN

This book is one of the most simply written books published. It is just the book which the heating engineer needs who has received a limited education.

Postage Paid $1.25

TECHNICAL BOOK DEPT.
MACLEAN PUBLISHING COMPANY, LIMITED
143-153 UNIVERSITY AVE., TORONTO



DART UNIONS

2—Two Bronze Seats—2

Prevent Corrosion

Malleable Iron Pipe Ends and Nut Insure Strength and Durability

THESE two points are essential to make perfect and lasting joints.

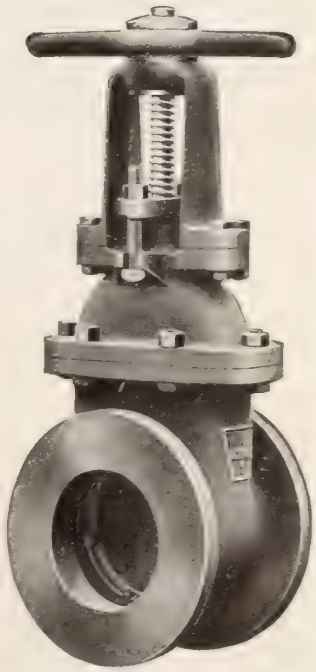
Twenty-four years of successful record is your guarantee of the Dart construction.

DART UNION CO., LIMITED
TORONTO, CANADA

There Are Lots of Gate Valves

advertised and sold, but not all of them possess that neat appearance, combined with strength and stability, which characterizes

KERR IRON BODY GATE VALVES



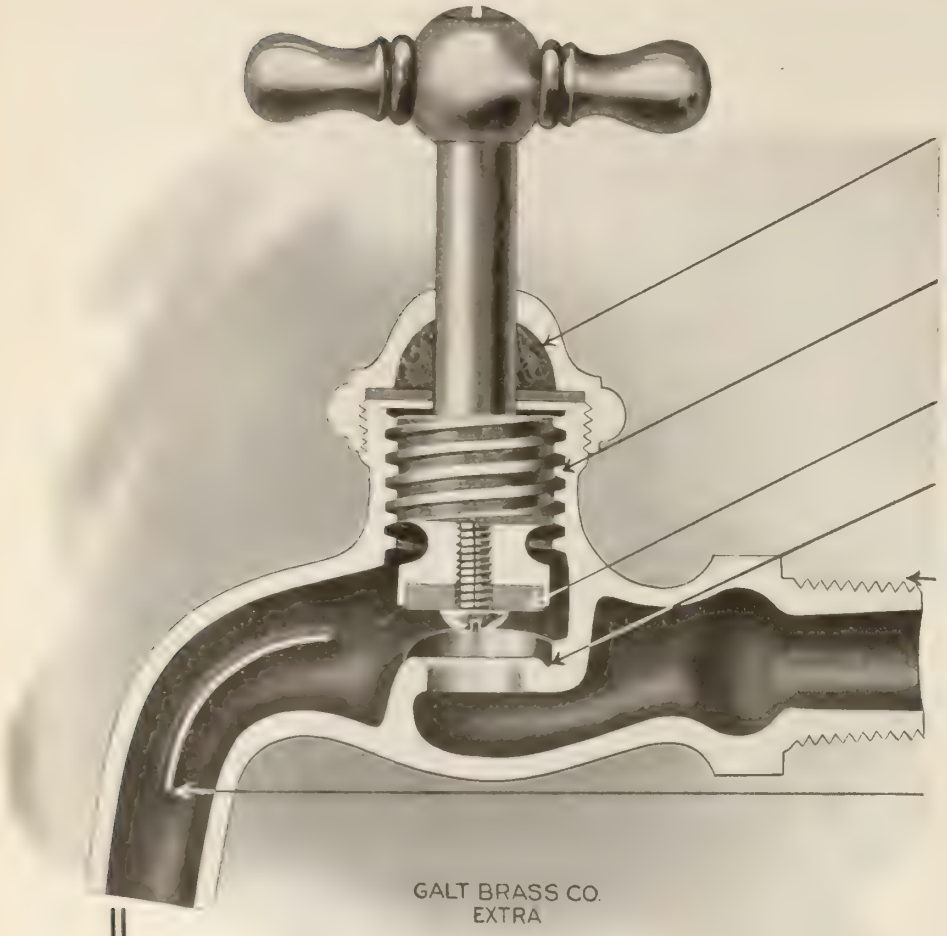
Specify KERR'S (KEYSTONE) Iron Body Gate Valves on your next order, and let us prove what we claim for them.

Our Catalogue No. 5 tells all about them. It is yours for the asking. Write us to-day.

Approved by the Fire Underwriters Association, and Registered by Boiler Inspection Departments of Ontario, Saskatchewan and Alberta.

THE KERR ENGINE COMPANY, LIMITED - Walkerville, Ontario

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. X | Publication Office: TORONTO, AUGUST 15, 1916 | No. 16

Empire Roller Bearing Basin Cocks

PLATE A440

THIS design is so constructed that all the metal is just where it belongs. The springs are made of high-grade phosphor bronze, and the most durable washers are used. They are beautifully finished and are the most reliable Ball Bearing Spring Tap on the market. Made in four arm or lever handle. We also manufacture the same style in Sink Bibs. These Taps are meeting with great approval wherever they have been installed.

If in the market for Shampoo Cocks, be sure and look up our line. We have a Shampoo Cock to suit all requirements.

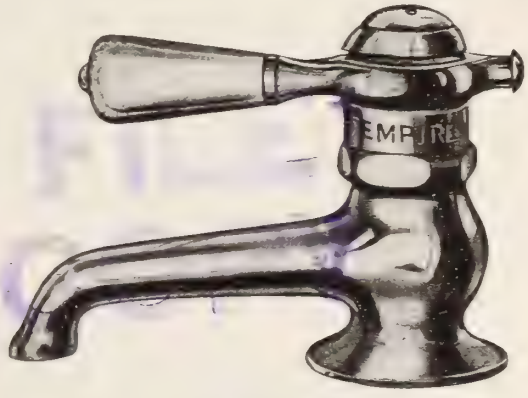


PLATE A441

By using Empire Brass Goods you are sure of having satisfied customers.

WE MAKE PROMPT SHIPMENT.

Empire Mfg. Company, Limited

LONDON TORONTO

The Goods You'll Eventually Buy

Based upon a quality, second to none; you make no mistake in starting now to supply your customers with BEAVER BRAND White Enamel Ware

Ask your jobber for BEAVER BRAND CAST IRON ENAMEL WARE
and build up your reputation

EVERY DOLLAR WE OWN STANDS BEHIND THE GOODS WE MAKE

Amherst Foundry Co., Limited

General Offices and Factory: Amherst, Nova Scotia

WRITE YOUR NEAREST AGENCY

AGENCIES:

ONTARIO:
Monarch Brass Mfg. Co., 71 Brown St., Toronto

MANITOBA and NORTHWEST:
E. B. Plewes, 120 Lombard St., Winnipeg

CANADIAN CONSOLIDATED RUBBER CO., LIMITED
DOMINION
RUBBER SYSTEM
AND ASSOCIATED COMPANIES

High-Grade Qualities

When buying or recommending Dominion Rubber System products you can depend upon high-grade qualities. That protection is being appreciated more and more by users of Rubber Goods, no matter for what purpose the need may be.

Absolutely High-Grade Quality is Our First Consideration

Dominion Rubber System qualities combined with Dominion Rubber System value and service, make it well worth your while to insist on having Dominion Rubber System products.

If you cannot get what you want, write to our nearest branch or to our Head Office, where your request will receive prompt and courteous attention. Our aim is to serve and please the Plumbing and Steamfitting trades.

Canadian Consolidated Rubber Co., Limited

MONTREAL, P.Q.

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28 "SERVICE" BRANCHES THROUGHOUT CANADA

The Boiler with a Separate Crown Sheet Section

Front view of the Burnham Fire Pot Section with the crown sheet section tipped back.

THE crown sheet and fire pot in the Burnham Boiler are separate sections. This makes getting it through narrow doorways and down cellar stairs a simple matter.

It cuts down repair troubles and expenses, for when there's trouble with the crown sheet or fire pot, the injured section only need be replaced, not the usual two, cast in one.

Here's another point, the distinct advantage of which you'll recognize at once. The intermediate sections are reversible. This means that the smoke pipe will always be at the back of the boiler, no matter how many sections are added.

Send for our catalog. It tells in a straight-from-the-shoulder-way some other common sense reasons why the Burnham Boiler is the boiler for you to sell.

We sell to the recognized jobber and the legitimate plumbing and heating trade only. No goods sold retail.

As the tip-back looks from the rear.

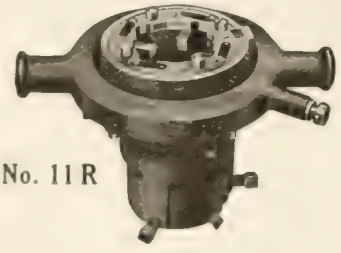
Lord & Burnham Co. Limited of Canada

Builders of Greenhouses and Conservatories

(Boiler Department)

Royal Bank Bldg., TORONTO — **Factory: ST. CATHARINES, ONT.**

Burnham Cosy Comfort Heat BB



No. 11 R

"Jardine" Adjustable Ratchet-Threading Tool

Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely enclosed, excluding chips and dirt.

YOU CAN REDUCE THE LABOR OF PIPE THREADING 50 PER CENT., AND MAKE THREADS AS CLEAN AND PERFECT AS IF CUT ON A LATHE WITH ONLY ONE CUT WITH

"Jardine" and "Toledo" Pipe-Threading Tools

"Jardine" or "Toledo" dies spare the muscle of the man who does the work, and save money for the man who pays the wages, as they enable one man to do the work of two and costs less for repairs. No cams or jimcracks to wear and get out of order. Cutters that cut, don't squeeze. Set of cutters for each size of pipe. Lead screw ensures perfect pitch and form of threads. Adjustable to all variations of fittings, very durable cutters.

All threads finished at one cut. One man does the work of two.

It will pay you to look well into the merits of the "Jardine" and "Toledo" before placing your next order for tools of this kind.

Write for catalog and full particulars.

We'll gladly supply the names if you wish to have a chat with users in your town.

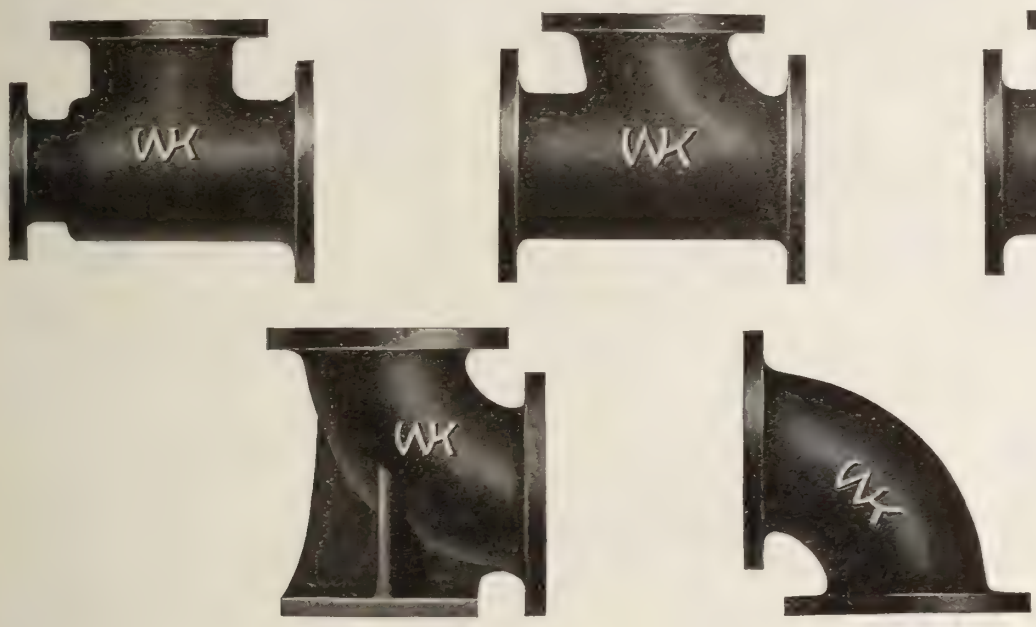
MADE IN CANADA

A. B. JARDINE & CO.

HESPELER, ONT.

Sole makers of "Jardine" Pipe-Threading Tools.
Sole licensees to manufacture and sell Toledo Pipe-Threading Tools in Canada.
Agents, Winnipeg and West—Stanley Brock, Ltd., Winnipeg, Man.
Brockville and East—J. R. Devereux, 233 St. James St., Montreal.

FLANGED FITTINGS



Made in Canada

Our other lines:

DAISY Hot Water Boilers.
VIKING Sectional Steam and Hot Water Boilers.
VIKING Steam and Hot Water Radiators.
Smokeless and Firebox Boilers.
Tank Heaters.

We manufacture and carry in stock a complete line of flanged fittings, both standard and extra heavy.

WARDEN KING, LIMITED

MONTREAL

BRANCH
200 Adelaide St. West, Toronto

CITY SALES OFFICE:
151 Craig St. West, Montreal

Your Invitation Mr. Sanitary Engineer

Aylmer

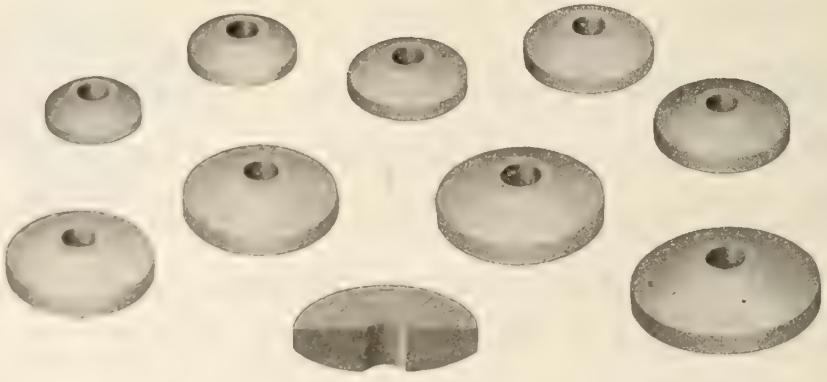
WE WANT YOU TO VISIT OUR EXHIBIT, MACHINERY HALL, TORONTO EXHIBITION. THE MOST COMPLETE LINE OF WATER SYSTEMS EVER SHOWN IN CANADA.

BE SURE TO SEE THE AYLMER FRESH WATER SYSTEM AND AYLMER ELECTRICAL AND GASOLINE ENGINE PUMPING UNITS.

THE STANDARD OF CANADA.

The Aylmer Pump & Scale Co., Limited, Established 1887 AYLMER, ONTARIO

Note Number of Sizes in Stock



A Size for every Need

Wolverine Tapered Bibb Washers

The ROUNDED TAPER will more readily fit imperfect seats.
Will not crumble or flatten out.

Compounded from asbestos and rubber making a washer which is equally as satisfactory on hot as cold water.

Send for a sample package of

Wolverine Bibb Washers and Fuller Balls.

ONCE TRIED—ALWAYS USED

Canadian Wolverine Co., Ltd. **Chatham, Ont.**

Owing to pressure of business we are not at the Exhibition this year, but

We shall be pleased to have

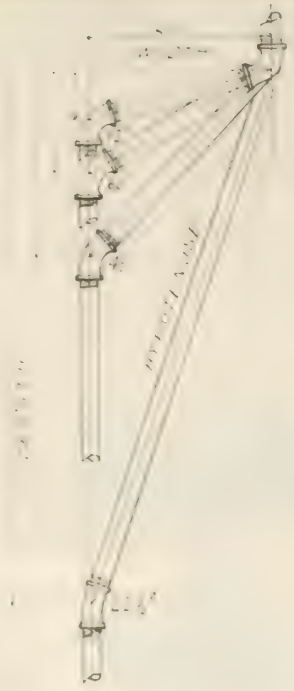
OUR FRIENDS

inspect our new showrooms

when visiting the Exhibition.

THE CANADA METAL CO., LIMITED

FRASER AVENUE **TORONTO** NEXT STREET **EAST** OF DUFFERIN

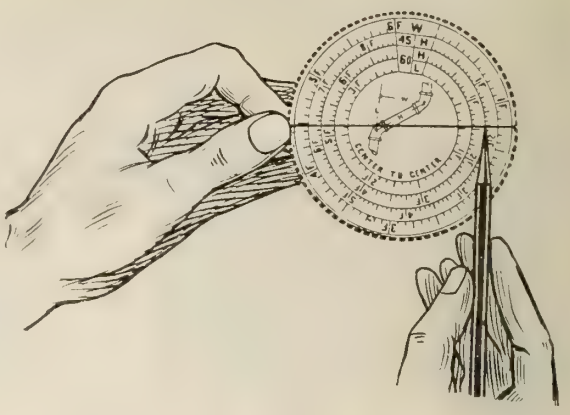


Angle Measurements made easy with

Kolar's Pipe Fitters' Scale

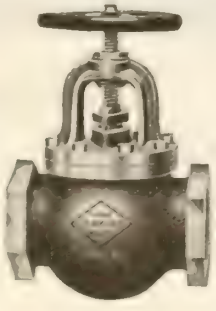
For Plumbers, Gas and Steam Fitters and any mechanic who has pipe angles to measure.

EASY — SIMPLE — CORRECT



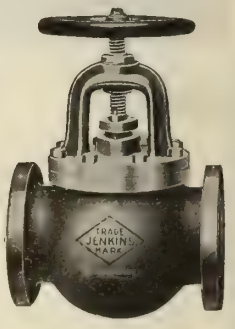
Kolar's Scale is to assist mechanics, contractors and architects, in cutting angle pipe, making estimates, or figuring plans. It will save you hours of time. With your centre to centre width, it gives you the Hypotenuse and length, in an instant. You can take measurements from one inch to any length. It being circular and graduated on either side, makes it possible to give the largest range of measurements in the most compact form. For 45-60-72 and 22½ Degree Fittings.

For sale by jobbers, hardware stores, and fine instrument dealers, or by sending the price to the Kolar Mfg. Co., 203 Adams St., Portland, Oregon, U.S.A. Use the scale 10 days and if not satisfied, return it and we will return your money. Over 3,000 sold. Not one ever returned. Made in two styles. Brass disc scale, $2.00; Celluloid Composition, $1.00.

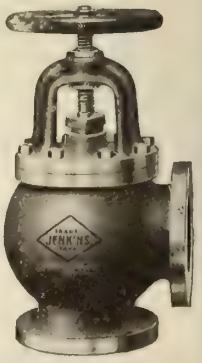


Jenkins Bros.' Valves

have the Diamond Trade Mark



The Jenkins Bros.' Standard Pattern Iron Body Valves are generally recognized as being heavier, considerably stronger, and more durable than the average iron body valves on the market. The bodies are carefully designed to insure equal distribution of metal. The yokes are wide, giving easy access to the stuffing boxes which can be packed under full pressure when wide open. Fitted with the new Jenkins Bros.' No. 119 Disc when intended for steam service; or discs of softer pliable composition when specified for cold water or other liquids. Renewable bronze seat rings.



Approved for use in the Western Provinces by the Depts. of Public Works.

Write for Catalogue 8.

Jenkins Bros., Limited

103 Remi St. . MONTREAL

OSBORNE HOUSE, ISLE OF WIGHT
FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

ROYAL PALACE OF LA MAGDALENA
SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN

SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

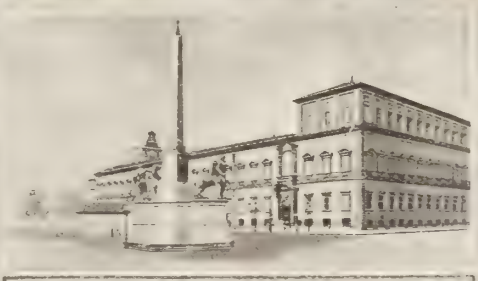
Standard Sanitary Mfg. Co.
Limited

General Offices and Factory: Royce and Lansdowne Aves., Toronto, Ontario

TORONTO STORE
55-59 Richmond Street, West

HAMILTON STORE
20-28 Jackson Street, West

BALMORAL CASTLE
SCOTTISH RESIDENCE OF THE KING AND QUEEN OF ENGLAND

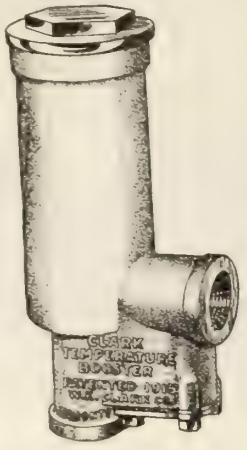


THE QUIRINAL
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ITALY, ROME

BUCKINGHAM PALACE
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ENGLAND, LONDON

PALACE OF THE KING OF THE BELGIANS
BRUSSELS

WHAT WE WILL DO FOR VISITING STEAMFITTERS



During Fair Week we will have an eight-cylinder touring car which will be placed at our visitors' disposal for sight-seeing around the city.

Just Ring Adelaide 136

—THAT'S ALL—

W. E. CLARK COMPANY

719 King Street West - Toronto, Canada

Modern Advance Demands
TUEC Service

(MADE IN CANADA)

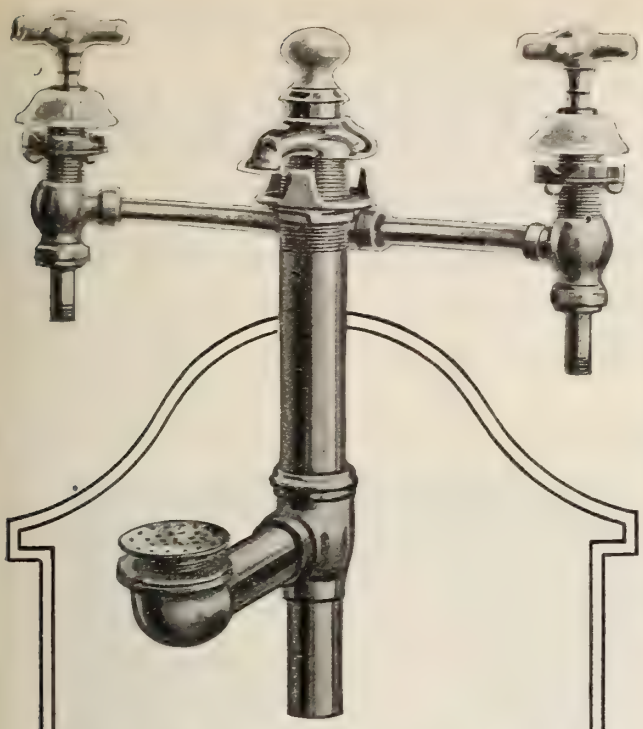
The telephone, which but a few years ago was called a luxury, is to-day installed in every business office and most every home. The time is not far distant when the **Tuec Stationary Cleaner** will be installed wherever cleanliness is considered worth while. Who is the logical one to make these sales and installations? None other than the plumber. Now is the time for you to step in, Mr. Plumber, and grasp this business before other enterprising merchants do it. Let us tell you about our co-operation plans.

Write to-day.

THE UNITED ELECTRIC COMPANY

159 Richmond Street West, Toronto, Ontario

TUEC RECEIVED GRAND PRIZE AT PANAMA-PACIFIC EXPOSITION



SPEAKMAN "UNIT" FIXTURES

(FOR LAVATORIES)

—open up for the plumber a wide avenue for new business.

This "Unit" Fixture will give you an opportunity to install a high-grade, up-to-date combination lavatory fixture at practically the cost of two good grade faucets and a waste.

But remember this point—we have not jeopardized Speakman reputation by allowing this fixture to sell at such advantageous prices. But the fixtures are so simple that the manufacturing cost has been held down without in any way affecting the high standard maintained in Speakman products.

These fixtures can be secured and delivered to you promptly from our Toronto stock.

Any special information and prices can be had by asking us. Do not hesitate to write, as there will be no obligation.

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SANITARY ENGINEER

PLUMBER AND STEAMFITTER OF CANADA

Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, AUGUST 15, 1916 No. 16

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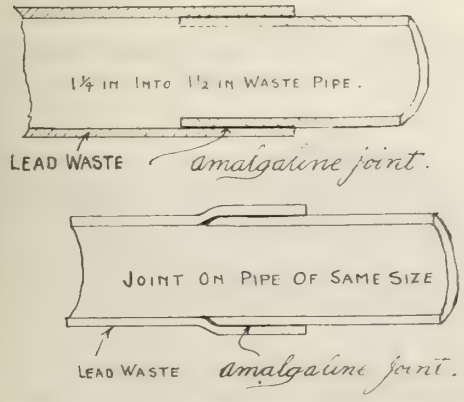

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THE SANITARY ENGINEER

VOL. X. AUGUST 15, 1916 No. 16

Public Comfort Stations

Their Location, Plan, Equipment and Care — Above-Ground Versus Underground Stations—Financial Considerations.

By Dr. Wm. Paul Gerhard, consulting engineer, New York City.

Reprinted from "The American City."

Plumbing fixtures should, as far as possible, be attached to the walls by strong fastenings and wall plates, thus leaving the entire floor under the fixtures free and accessible for cleaning. It may well be doubted whether a high-grade finish of all metal work, such as polished nickel-plating, is desirable. I hold the view that, in the interest of economy in construction, and to reduce the labor of keeping the metal work bright, it would be a better practice to use rough brass and galvanized iron for pipes, fittings and traps, and to enamel paint them with best white cream enamel paint.

Equipment

The equipment should in general, be such as to "create an atmosphere of absolute cleanliness and due regard for decorum." Cleanly habits should be encouraged by providing at least one lavatory in urinal stations, and several in the more complete stations, if possible with hot water and soap. On the women's side the provision of a sanitary receiver for soiled napkins will go far toward preventing the stoppage of water-closet fixtures.

I repeat the assertion heretofore made that the tendency in the past has been, not only to provide buildings of unnecessarily large dimensions, but also to install too many fixtures, thus making both first cost and the item of maintenance unduly high. I consider a station with 10 closets for men, 5 closets for women, 10 urinals, 3 lavatories on each side, and with 2 drinking fountains, to be amply large for highly populated city districts. For the residential districts, for parks, etc., the stations should have not more than half the above number of fixtures.

Another mistake to be avoided is to provide any toilet accessories used by more than one person, for they are apt to become disease-spreaders. Accordingly, roller towels, drinking cups or glasses, combs, hair and nail brushes, cakes of soap, and so forth, should be absolutely prohibited. The essential supplies required are toilet paper, liquid or powdered soap, paper towels, and individual drinking cups, though the latter are not needed when bubble fountains are installed.

This article would become unduly long were I to discuss in detail the important matter of plumbing installations and fixtures. Fixtures of the strongest, most durable and most sanitary type should be selected, for they are subject to almost continuous and often rough usage. Pure white glazed earthen fixtures, with no embossing or decoration, set in pure white compartments, foster a feeling of decency and aid in inducing cleanly habits. To frustrate the ever-present danger of an abuse of the fixtures, they should have no loose or detachable parts liable to be tampered with or to be taken away. All working parts of the flushing mechanism of urinals and closets, except the push buttons, should be located in the utility corridors, accessible only to the attendants. Simplicity in action is the main requirement of all flushing devices.

Hot water, while not absolutely necessary at the basins, is quite desirable to encourage the habit of washing the hands after use of the toilet conveniences. For the maintenance of cleanliness in the stations hot water is necessary at the slop-sinks.

Much study should be given to the heating, ventilating and lighting of the stations. A heating system is essential for the comfort of both visitors and of attendants, and also to prevent damage to the plumbing pipes and traps in very cold weather, though it is is not necessary to provide the same amount of heat as for living rooms. Unheated comfort stations have been tried and abandoned. Proper ventilation should likewise be provided in the design, and some

Comfort Station in Edgewater Park, Cleveland. *Shelter and Boat House in O'Fallow Park, St. Louis.*

artificial system is required, both in the underground stations as well as in those above ground, for the ordinary window ventilation in these is out of the question during a large part of the year in very cold climates. The lighting should be abundant both in daytime and at night, to do away with dark corners where dirt may otherwise accumulate. In this particular point above-ground stations enjoy the great advantage of the sunlight, while underground stations must have recourse to vault or sidewalk lights and to artificial illumination even in daytime .

Care of Comfort Stations.

The thorough daily cleaning of the stations, made necessary by the carelessness of many of its users, is an important duty relegated to the attendants, who should be trustworthy and diligent servants, selected for their position because of their fitness, and not on account of political affiliations. A neglected and ill-cleaned station is sure to fail in its purpose as a public utility.

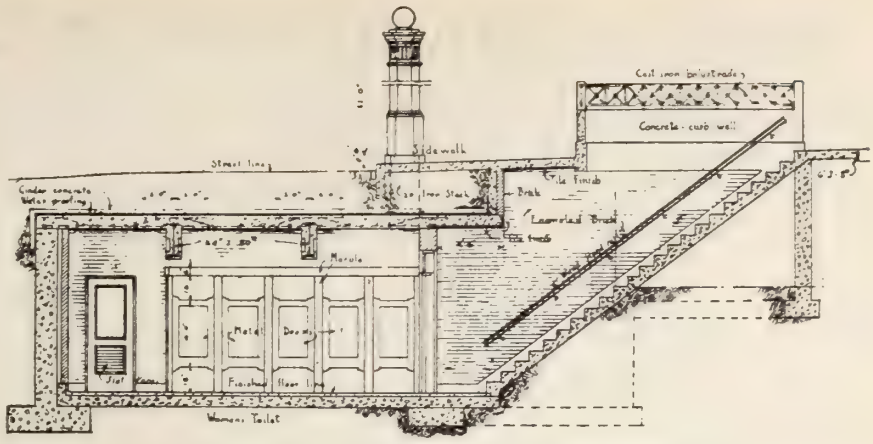
In the larger stations attendants should be on the constant lookout so that no loose or easily detached fittings are appropriated and that no loitering or defacing of walls takes place. To do this efficiently attendants should be given police powers, as is the case in office and bank buildings. Attendants should therefore be uniformed, white suits being the best. Attendants should be polite and attentive. Large stations, if kept open day and night, require at least two shifts of attendants, whereas in the case of the smaller urinal stations the cleaning service can be performed by porters, who are given a number of stations to look after daily. While the annual wages bill for attendants forms a heavy item in the cost of maintenance, the annual cost of repairs will be decreased thereby.

Periodical Inspections.

The attendants' work should be regulated and checked by the municipal department in charge of the stations. It should be one of the duties of the officials of this department to make periodical sanitary inspections, during which the condition of the station entrances, the walls, the floors and the fixtures should be noted, also the absence or presence of odors, dirt and litter, the use of disinfectants, and kindred matters of detail.

Particular attention should be paid to the statistics of the average daily number of users of the stations, and the fact ascertained whether there is an insufficient, or else any superfluous, equipment as to the number of fixtures installed.

If the station includes revenue-bearing features, the amount derived from each of these should be carefully noted.



Plan of underground comfort station in Pittsburgh, Pa.

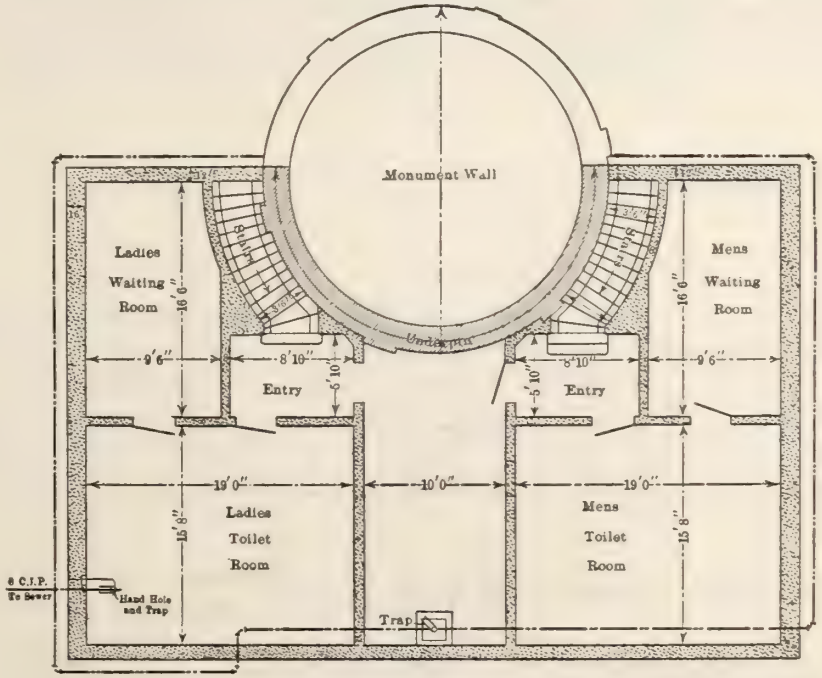
Financial Considerations

The question whether it is preferable to build and operate comfort stations under municipal ownership, or else to give the privilege, as has sometimes been suggested, to private concerns, may be dismissed by stating that unquestionably such public structures should be put up by the city. Another question, less easily answered, is whether a fee should not be charged for the use of fixtures? In Europe the fee system is almost universal, whereas a free use appears to be demanded in the United States. But why? Would it not be better to have half-a-dozen stations suitably distributed and to charge a minimum fee which would help in their proper maintenance rather than have but one station and this a free one?

We cannot shut our eyes to the fact that during past years the principle followed has been to build a few large and elaborate stations rather than to erect a large number of smaller stations, nor can we overlook the fact that many of the stations built in cities like New York, Brooklyn and Washington, D. C., have been unnecessarily costly. Personally I hold the view that this was a tremendous mistake, which was aggravated by the further fact that the cost of operation and maintenance became enormously high. Recent comparisons between European (chiefly English) and American stations point out the fact that the former show an annual net revenue, whereas the American stations are operated at a loss. Why should this be so?

I believe the principal explanation to be the fact that in both large and small comfort stations in Europe a great deal of attention is paid to revenue-bearing features, such as pay compartments, bootblack, cigar and newspaper stands, parcel-checking depots, telephone booths and information bureaus, where direc-

(Continued on page 25).



Plan of underground comfort station in Toledo, Ohio. Built around a monument wall.

Sanitary Equipment at Camp Borden

Every Convenience Provided and More, Splendid Supply of Good Water, Adequate Number of Sanitary Drinking Fountains—Sewage Disposal Plant of Most Modern Design.

By "One of Us."

"YES I've been brought up on a farm all my life" was the reply of a young soldier now in training at Camp Borden, when asked if he had lived in the country very long.

"And how do you like the new camp, what is your impression of it now?" I then asked him.

"Well for my part I think it is an ideal spot for a camping ground. It is of course very dusty, or I should say sandy, but apart from that everything is fine. The sanitary arrangements could scarcely be better. I know this, when I get home I'm going to have our farm rigged up in just the same way. We have good water, and I don't see why I can't use a small gasoline driven pump and a small tank just as is done on this camp". Leaving my friend the soldier farmer I wended my way to head quarters. There I was directed to the construction office, and, upon stating my business was given French leave, told to just go where I pleased, take all the photos I cared to and make any sketches I wanted.

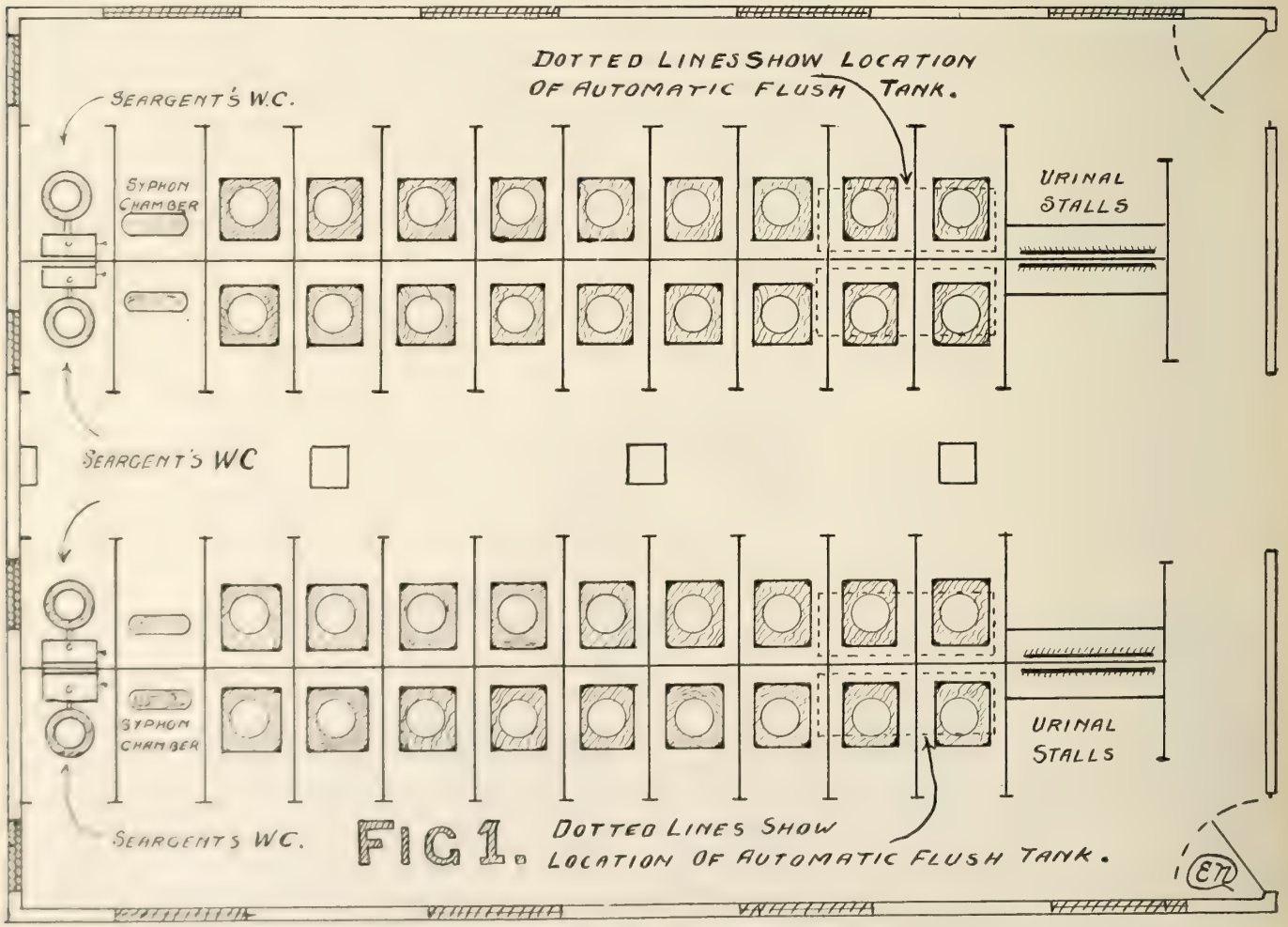
The camp covers an area of some 17000 acres, and is a 25 minutes ride from Allandale via the Grand Trunk Railway. It is well laid out, and might well be termed a city under canvas.

Every battalion has its own complement of sanitary fixtures, Fig. 1 shows the layout of the urinal stalls and w. c's. for sergeants and privates. The building is of wood, lined inside and out with cement, which was applied by compressed air, and has the appearance of a permanent building.

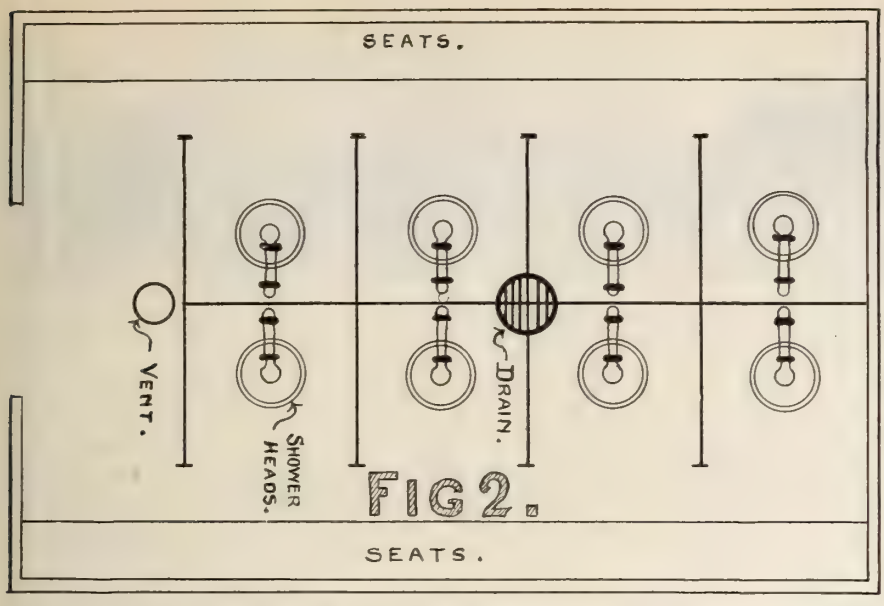
The equipment consists of 4 batteries of water closets. Each row is flushed automatically. At the far end of each row is a separate hopper closet, for the sergeants. Four urinal stalls are situated at the entrance of each building.

All the fixtures are cast iron, black enamelware. The floors are of concrete, and every morning the whole building is washed out thoroughly and disinfected. All the soil and waste pipe is cast iron under the buildings. The main drains are of glazed tile.

Fig. 2 shows a set of showers which also is provided for each Battalion, all in enclosures, though there is as yet no roof. It would appear that if necessary, a roof can be easily fitted up. The floors of the showers are of concrete, each shower is in a separate stall and



Layout of W. C. and urinal equipment for each battalion now in training at Camp Borden.



Layout of showers for soldiers in training at Camp Borden—each battalion have similar equipment.

all are drained to one common centre as shown. There is plenty of room to move around. These showers are thoroughly appreciated by one and all. They are of brass, with valve to control supply and piping is of ½ inch galvanized iron.

Next to the showers are situated two long rows of tables in the centre of which a galvanized iron trough is fitted, this is to empty the water into after washing. A pipe is run along the centre and five self closing cocks are fitted to each side over as many tin bowls. At one end of each of these stands a self-closing sanitary drinking fountain. All the brass goods are nickel plated. As to the quality, one could not vouch, as there is no name on any one of these fixtures.

The trough is trapped in the regular way and connected to the sewers. As stated before each battalion has the same conveniences.

The officers of each battalion are furnished with separate lavatory accomodation, though very little different in design, Fig. 3 shows the urinal and w. c. Each w. c. is of the hopper type, cast iron, black enamelware and is flushed by a regular overhead ball cock and w. c. tank. The urinals are all solid porcelain, with a flush tank similar to those fitted to the W. C's.

Fig. 4 shows the layout of the showers provided for the officers of each battalion, all of which are fitted up in the same manner as are those provided for men. These buildings are separate, and stand side by side. The same kind of wash basins and drinking fountains are provided as in the case of the men, except that a smaller number are fitted to each washing table.

All the sewage is conveyed through large tile drains of sufficient size to a large concrete septic tank situated on the outskirts of the tank. This tank is one of the most modern type similar in design to the Imhoff sewage tank.

The total sanitary equipment for the whole camp is probably the largest of any one military camp in the world. A large elevated steel tank standing about 110 feet high furnishes water all over the camp at a pressure of approximately 45 lbs. per square inch, and holding somewhere in the neighborhood of 25,000 galls. Another tank of the same size is under construction and will be erected at the opposite end of the camp to which the present one is situated.

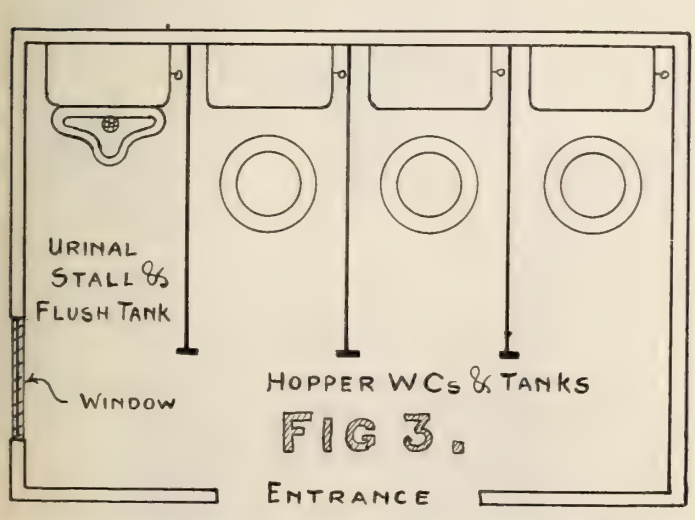
It is estimated that over 40 miles of water pipe is in use from 8 inches down to ½in. 15 miles of this pipe is necessary for the mains only, which are from 3 inch up. This piping is all black iron, the services and short branches are galvanized pipe, and are laid as near as possible so as to drain to several outlets, the large mains being laid below the frost line.

A number of cottages are at present under construction each of which are to be fitted up with a serviceable bath, lavatory, w. c., sink and range boiler.

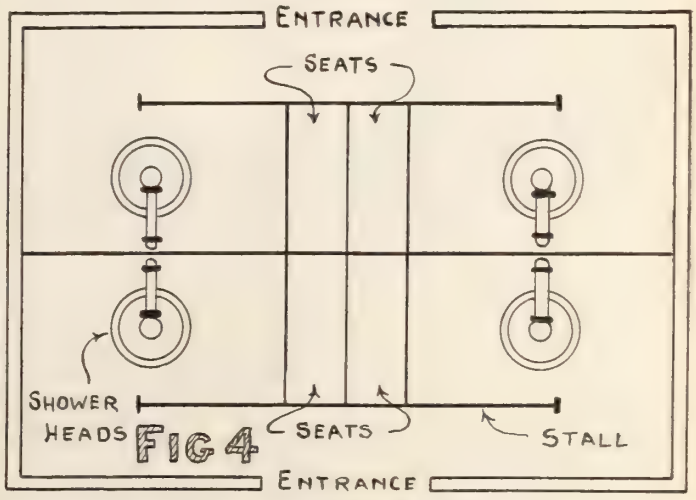
The total amount of W. C's. amount to about 1700, and approximately 500 showers, all of which are constructed in the same manner as shown in Figs. 1, 2, 3 and 4.

Each battalion is also furnished with a small garbage burner and the men certainly take an interest in keeping their several battalion enclosures in good order. The absence of unsanitary matter is one of the chief outstanding features of the camp, in spite of the fact that every thing is not quite completed yet.

The whole layout reflects no small amount of credit upon Col. Lowe and



W. C. and urinal accommodation for officers only, each battalion has similar equipment provided.



Shower accommodation provided for the officers—each battalion have their own installation.

1. View of buildings erected for officers in which W. C. urinal and shower bath appliances are installed. 2. Wash trays and drinking fountain. 3 Garbage burner, each battalion furnished with one.

his able assistant Major Barrie. It is all very well for those outside of the work to criticize, but it would be safe to assert that once a person has been right on the ground, taken account of all that has been done and is now in use, much of the adverse criticism will vanish. If the same care and forethought had been brought into play when our towns and cities were being planned as has been put into the planning of camp Borden, Canada would have been the proud possessor of the best laid out towns and cities in the world.

It is estimated that 200,000 people from the United States annually visit the Canadian National Exhibition.

A Novel Water Supply System

Necessity is the Mother of Invention—A Farmer Knows What He Wants and Gets It—High and Low Pressure Water From the Same Pump—Works Automatically.

ONE of the latest inventions to come to our notice is that of a novel water supply system, which is now in operation on several farms. The inventor, a farmer, gifted with no small amount of ingenuity, and knowing little or nothing about pneumatic water systems, took upon himself to construct one suitable to the requirements of his own, as well as the average farm.

The first obstacle which cropped up was the cost of a sufficiently large storage tank, and being well aware and thoroughly convinced that a storage tank in the attic would not be sanitary, he had to devise some other means. The next problem that presented itself was that of the amount of water he would have to store, as well as the pressure necessary. The cattle would consume a great deal more water than the members of the household, and no pressure would be necessary to keep the drinking troughs full of water. Then, again, his windmill

A very novel system. Can be attached to any kind of motive power, where a larger number of cattle requires water than is needed for household purposes a great saving in power and mechanical wear and tear is effected by reason of it operating automatically.

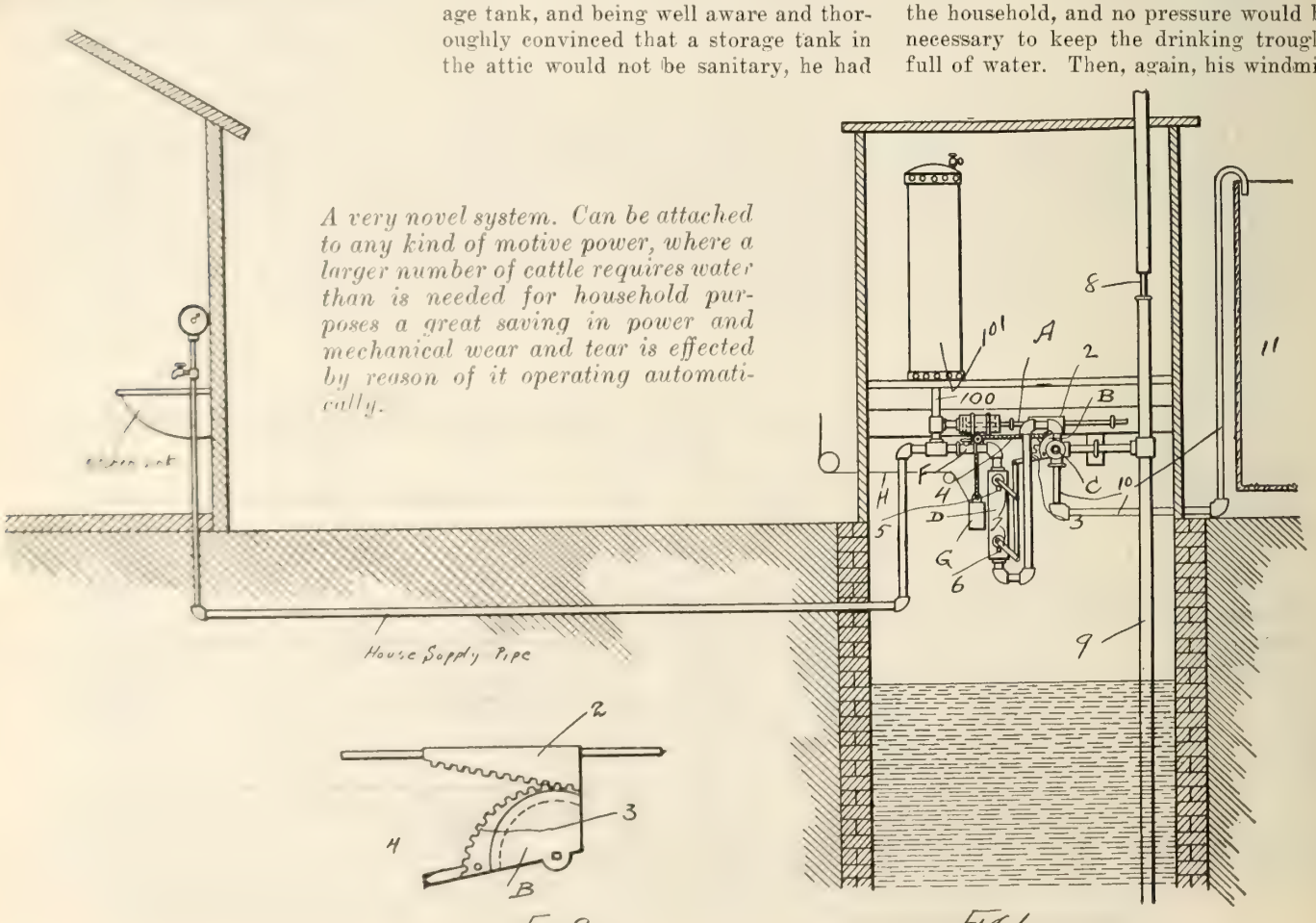


Fig. 1.

Fig. 2.

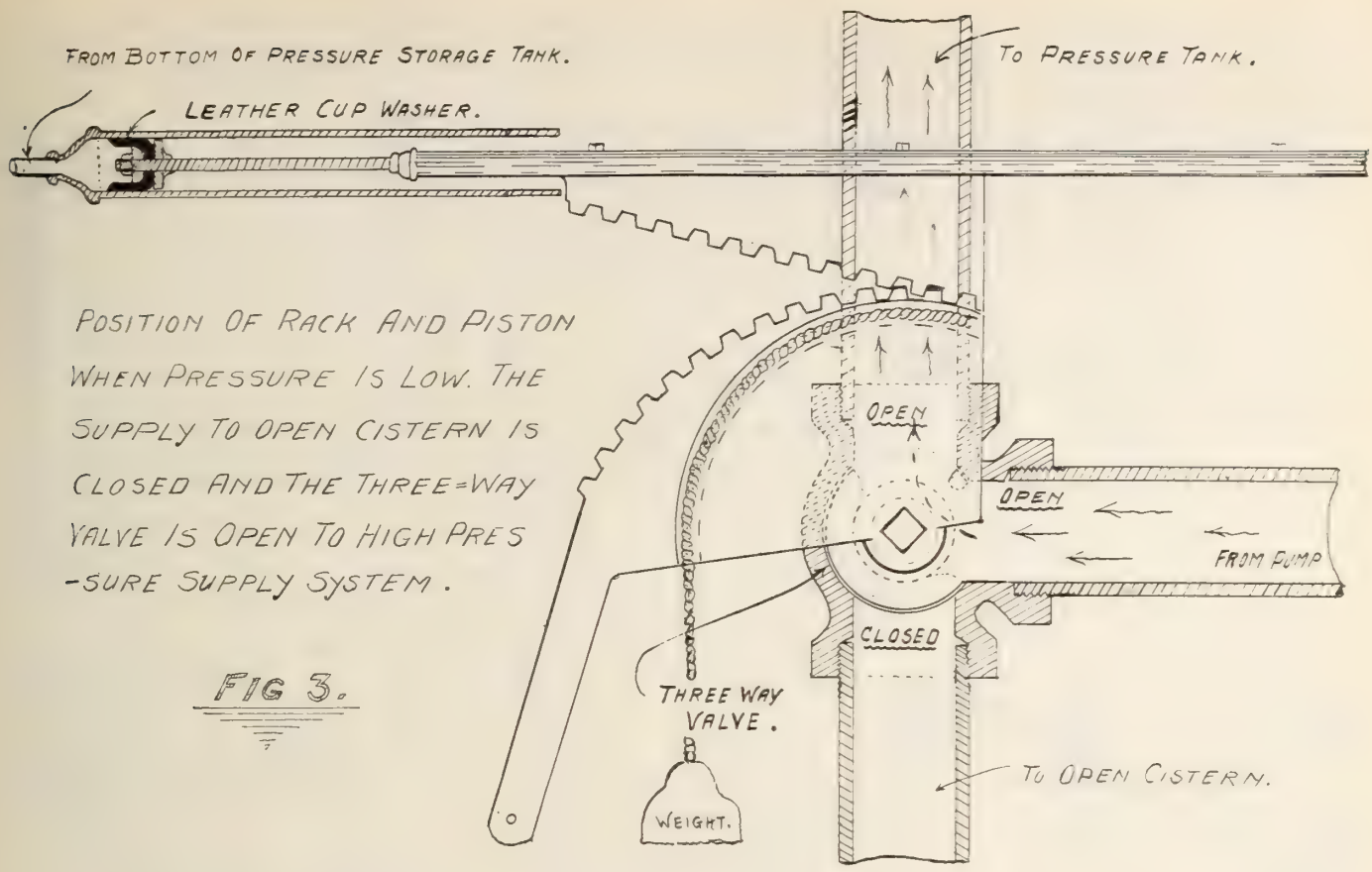

FROM BOTTOM OF PRESSURE STORAGE TANK.
LEATHER CUP WASHER.
TO PRESSURE TANK.
POSITION OF RACK AND PISTON WHEN PRESSURE IS LOW. THE SUPPLY TO OPEN CISTERN IS CLOSED AND THE THREE-WAY VALVE IS OPEN TO HIGH PRES-SURE SUPPLY SYSTEM.
OPEN
OPEN
FROM PUMP
CLOSED
THREE WAY VALVE.
WEIGHT.
TO OPEN CISTERN.

FIG 3.

was not quite equal to the task of supplying a big volume of water at high pressure, particularly when the wind was not blowing very strongly. Therefore, it appeared to this farmer that if he could in some way or other devise a means of furnishing a large volume of water at low pressure and a smaller quantity at high pressure, the former would supply the wants of the cattle and the latter the wants of the house. Here is the story; but first it would be well to further explain that there were seven members of the family to be furnished with water at an average of 15 gallons per day, while there were 15 head of cattle, besides hogs, sheep and poultry. An average of 500 gallons per day for the farm stock, with about 15 gallons per head, 105 in all for the members of the household, would be ample. Then, again, when the wind was low there would be power enough to water the stock by keeping an open cistern full, whereas a stronger wind would be wanted to keep a couple of hundred gallons of water on hand at high pressure. This trouble was overcome.

First of all, two range boilers were procured and coupled together, though now there are four coupled. Then a large open storage cistern was made. This, for supplying water to the stock; the range boilers were for the house supply.

The pump which is driven by the windmill is connected to the tanks, as well as the open cistern, and a three-way valve is fitted to the pump, cistern and pneumatic tanks.

A small brass cylinder is fitted so as to be in direct connection with the high pressure tank. In this cylinder is a piston and cup leather very similar to an ordinary pump. This is about 1½ inches in diameter and 6 inches or so long.

When the pressure in the tank has been raised to, say, 60 lbs., or any other predetermined pressure, the pressure forces out the piston, to which an eccentric rack and cog-toothed quadrant is connected. A grove is fitted to this quadrant, in which a rope and weight operates, and between the weight and the rack a power is set up which changes over the three-way valve from high to low pressure.

Fig. 1 gives a general idea of what the apparatus looks like, though the tank shown is very much out of proportion.

A check valve is fitted in the high pressure supply from the pump to the tank so as to prevent any leakage during the period when the three-way valve is operating. Fig. 2 shows an enlarged view of the gears.

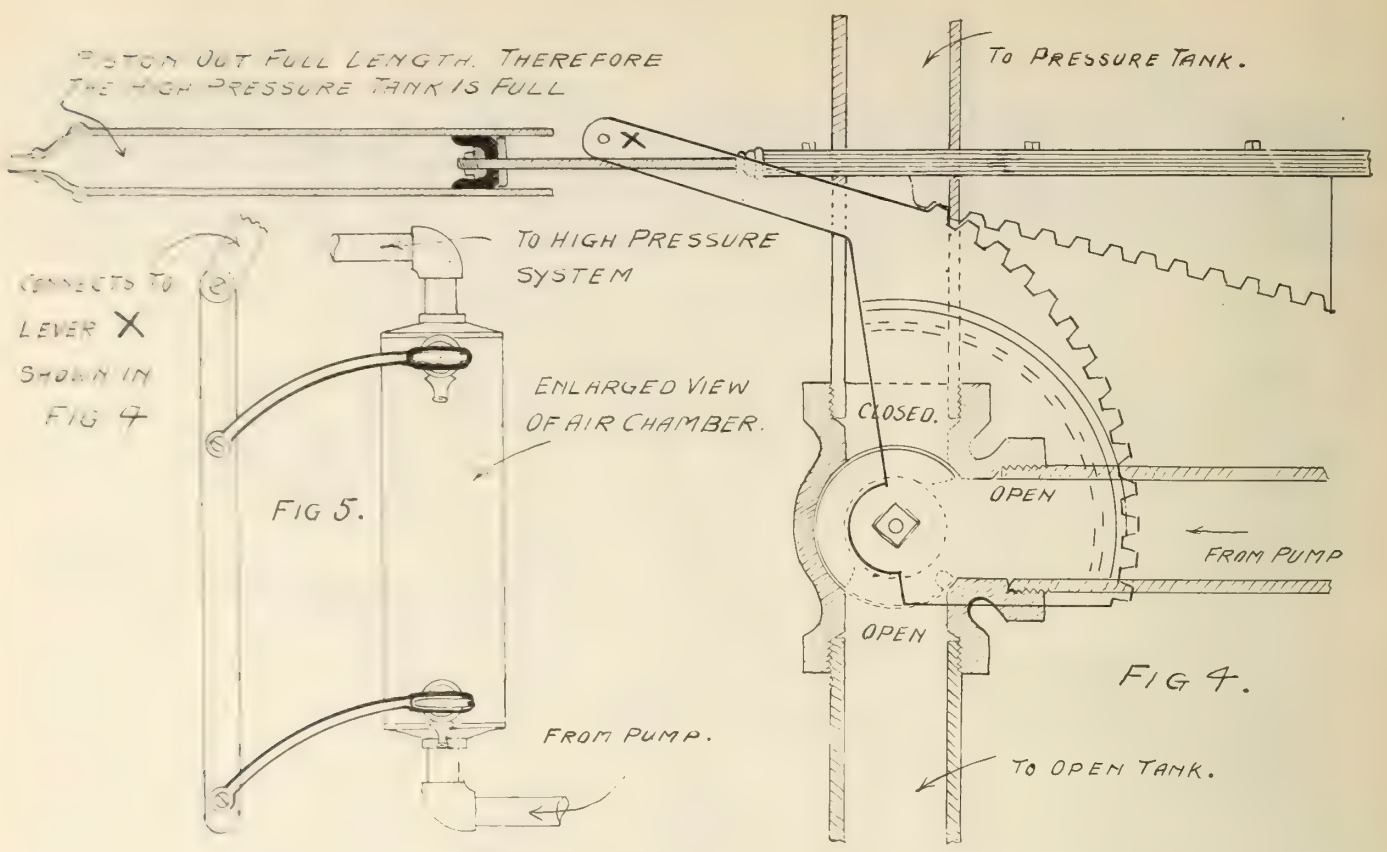
The method adopted to furnish a fresh supply of air due to the absorption is very novel, yet scientific to a degree. It has been predetermined what quantity of air is absorbed at each time the tank is filled, and a cylinder is provided to furnish this air. Fig 5 shows this cylinder enlarged.

Fig. 3 shows an enlarged view of the three-way valve in the position it would be in when the apparatus is supplying water to the pressure tank. It will be noted that the piston is full way in, which proves that the pressure is low. The supply pipe to the open cistern is, therefore, closed, and the openings in the three-way valve are in the position to furnish water direct to the pressure tank.

Now note the position of the piston in Fig. 4. This shows it full out; the pressure has forced it out, and at the same time has operated the three-way valve so as to close off the supply of water to pressure tank and allow the water to enter the cistern. The valve remains in this position until the cistern is full, when a large float operates the windmill attachment and shuts off the wind.

If, however, the pressure in the pressure tank lowers sufficiently to require more water in it, the piston again throws in the windmill attachment, and it stays there until the pressure tank is full again. In all cases the house pressure tank gets the preference.

It might not be out of place to again refer to the air cylinder shown in Fig. 5, and explain how it operates.



When the pressure tank has been filled, the two small pet cocks are opened which drains the water out of the cylinder and supply pipe to tank, thus filling the cylinder with air. Then as soon as the pump begins to force water into the tank again the pet cocks are closed, thus confining the air, which is in turn forced into the pressure tank with the first few strokes of the pump. The size of the cylinder is scientifically determined by the volume of water which is pumped into the tank each time it operates.

New Canadian Patents

No. 167171

Andrew L. Klein, San Francisco, California, U. S. A., 18th January, 1916; 6 years. Filed 30th June, 1915. Receipt No. 253,468.

Claim.—1. A sanitary pad for toilet seats including a substantially U-shaped base adapted to rest upon the front and side portions of a toilet seat, and a plurality of super-imposed layers of ablel paper correspondingly shaped secured by their edges to each other and to the base, said sheets at their free ends being formed with extending

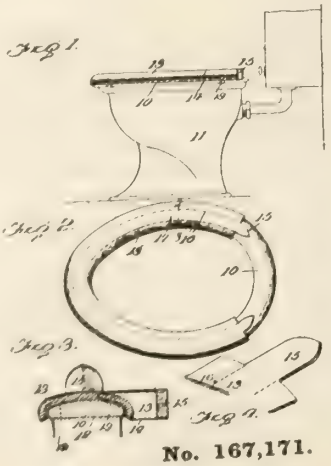
2. A sanitary pad for toilet seats including a substantially U-shaped base adapted to rest upon the front and side portions of a toilet seat, and a plurality of [illegible] sheets of ablel paper correspondingly shaped secured by their edges to each other and to the base, said sheets at their free ends being [illegible] with spaced series of perforations extending from the tongue at one end to that at the other.

3. A sanitary pad for toilet seats including a base adapted to rest upon a toilet seat, and a plurality of superimposed layers of paper secured by their edges to each other and to the base, each of the sheets being formed with a tongue and with lines of perforations extending longitudinally of the sheet from the sides of the tongue.

4. A sanitary pad for toilet seats including a base adapted to rest upon a toilet seat, and a plurality of U-shaped sheets of paper secured to the base and each terminating at its ends in rearwardly extending tongues.

5. A sanitary pad for toilet seats including a substantially U-shaped base adapted to rest upon the front and side portions of a toilet seat, and a plurality of superimposed layers of paper correspondingly shaped secured by their edges to each other and to the base, said sheets being formed with spaced series of perforations extending from end-to-end of the sheets.

6. A sanitary pad for toilet seats including a base adapted to rest upon and be secured to a toilet seat, and a plurality of superimposed layers of paper secured by their edges to each other and to the base, each layer of paper being formed intermediate its width with tongues which may be grasped to facilitate the removal of such layer.



No. 167,171.

Seat for Water Closets.

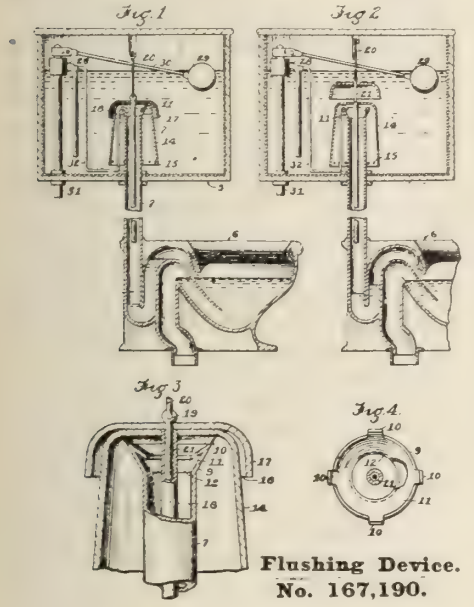
No. 167,190

Edward Thiry, Pasadena, California, U. S. A., 18th January, 1916; 6 years. Filed 6th December, 1915. Receipt No. 258,744.

Claim.—1. A flushing mechanism comprising in combination with a flush tank a bowl having a water trap therein, of

a discharge tube extending from a point midway in said tank through the bottom thereof into the long leg of said water trap, a bell having an opening in the dome thereof, a pipe secured in the opening of said bell and extending downwardly within said flush pipe, means to support said bell in concentric relation and with its dome a slight distance above the open end of said discharge pipe, and a domed closure normally resting on the dome of said bell to close said opening and the open end of said pipe secured therein.

2. A flushing mechanism, comprising in combination with a flush tank and bowl having a water trap therein, of a discharge tube extending from a point midway in said tank through the bottom thereof into the long leg of said water trap, a bell having an opening in the dome thereof, a pipe secured in



Flushing Device. No. 167,190.

the opening of said dome and extending downwardly within said flush pipe, means to support said bell in concentric relation and with its dome a slight distance above the open end of said discharge pipe, and a domed closure having a guide rod projecting into said pipe, said domed closure being adapted to normally rest on said dome of said bell to close said opening and the open end of said pipe secured therein.

3. A flushing mechanism, comprising in combination with a flush tank a bowl, a water trap in said bowl, a bell having an opening in the dome thereof, a pipe secured in the opening of said dome and extending downwardly within said flush pipe, means to support said bell in concentric relation and with its dome a slight distance above the open end of said discharge pipe, and a domed closure adapted to normally rest on the apex of said bell to close said opening and the open end of said pipe secured therein.

4. A flushing mechanism, comprising in combination with a flush tank and a bowl having a water trap therein, of a discharge tube having the open end in said tank flared, the other end leading to the said trap, a bell secured to the flaring end of said discharge tube, an air relief pipe extending into said discharge pipe secured at one end in an opening through the apex of the dome, and a dome closure loosely mounted on the dome of said bell to close the open end of said air relief pipe.

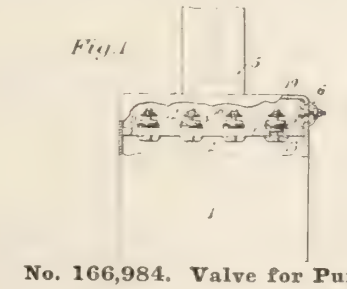
5. A flushing mechanism, comprising in combination with a flush tank a bowl having a water trap therein, of a discharge tube having the open end in said tank flared, the other end leading to the said trap and with a flared apron secured therein, a bell secured to the flared end of said discharge pipe, an air relief pipe extending into said discharge pipe and secured at one end in an opening through the apex of the dome of said bell to close the open end of said air relief pipe.

No. 166984

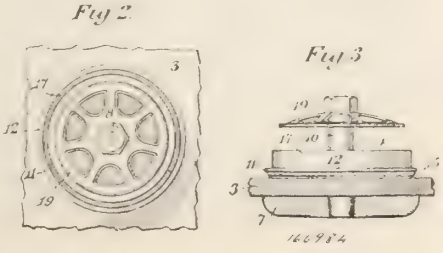
Thomas Gresenthwaite, Fall River, Massachusetts, U. S. A., 4th January, 1916; 6 years. Filed 29th November, 1915. Receipt No. 258,447.

Claim.—1. The combination with a support having an opening through which a fluid may pass, of a self-contained detachable valve and valve structure comprising a yoke adapted to bear against one side of the support, said yoke having a screw-threaded stem of uniform diameter, a grid or valve seat bearing against the opposite side of the aforesaid support, a disc valve surrounding the stem and resting on the seat or grid and removable from said stem in a direction away from said yoke, and a valve guard screwed on to the stem and adapted to limit the play of the disc valve in relation to the seat or grid.

The combination with a support hav-



No. 166,984. Valve for Pumps.

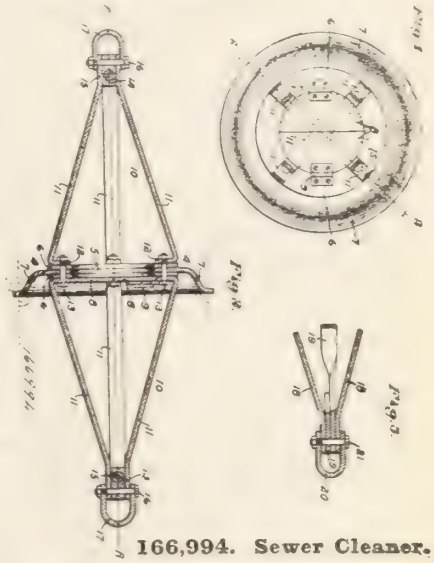


ing an opening through which a fluid may pass, of a self-contained detachable valve anl valve structure comprising a yoke adapted to bear against one side of the support, said yoke having a screw-threaded stem, a grid or valve seat bearing against the opposite side of the aforesaid support and provided with a sleeve or hub which is slidable on said stem, a valve guard on the screw-threaded part of the stem and adapted to clamp the seat or grid and the yoke against opposite sides of the support, and a disc valve slidable on said sleeve or hub and adapted to play between the seat or grid and the guard.

No. 166994

John Kelly, Jamaica Plains, Massachusetts, U. S. A., 4th January, 1916; 6 years. Filed 27th October, 1915. Receipt No. 257,416.

Claim.—1. A sewer pipe cleaning device, having in combination, means com-



166,994. Sewer Cleaner.

prising a pair of plates having a passage therethrough, means for closing said passage, flexible means projecting laterally from between the plates of the first-mentioned means and having an incline toward one side of the latter and adapted to engage the pipe at an abrupt angle thereto for directing the sewage inwardly toward said passage, and manipulating means secured to opposite sides of the first-mentioned means.

2. A sewer cleaning device, having in combination, means having a passage therethrough, means for closing said passage, flexible means projecting laterally from the first-mentioned means, said flexible means having a reverse curve formation and being inclined toward one side of the first-mentioned means, and manipulating means secured to opposite sides of the first-mentioned means.

Over 15,000 men did all or part of their training at the Exhibition Camp last winter.

Dust and Its Elimination

Dust, Man's Most Dreaded Enemy, Microbes About in Dust and Dark Places. Most Scientific Method of Cleaning up Dust is by a Stationary Vacuum Cleaner. Brooms Should be Re-named Death Dust Agitators

By "One of Us."

VOLUMES have been written and will be written which will go to prove the deadliness of dust.

Every medical student under the sun is being taught this. It causes more deaths than any one can compute, is consumed by our children, the mothers of our children, and ourselves.

Now, who of all craftsmen in the world can stamp out this deadly condition in which almost everybody is living?

The Sanitary Engineer. The man who becomes thoroughly convinced of a duty to perform—a duty which if fulfilled by him, will recompense him right here and now.

But somehow there seems to be a lack of realization of the fact by sanitary engineers as to the importance of a dustless home. Once he is convinced of the need of a dustless home, no doubt he will become more interested.

When the plumber and steamfitter of Canada assumed the title of "sanitary engineer," or "heating engineer," he ceased to be a mere plumber or a man who was simply a worker in lead; but to a certain extent he has failed to assume or shall we say realize the responsibility attached to the title.

Any one who claims to be a sanitary engineer should do all in his power to eliminate all conditions, wherever they be, that are not sanitary. The home should come first of all, the home where our babies are born. The home where we spend probably more than half of our lives, should be made sanitary in the very highest degree.

Is it? Do we assume that as sanitary engineers we have done our duty when we have installed simply a w.c. or two, a bath, a shower, sink, laundry tubs, and [illegible]?

Have we made that home as sanitary as lays in our power? No, not by any means. Then we are only partial sanitary engineers.

Suppose a medical man was called in [illegible] patient, and found that the patient was suffering from two diseases, would he prescribe for the one and ignore the other? Would he say to himself, "Well I'll bottle only prescribe for one of the diseases which will only mean one bottle of medicine. If I tackle the two diseases and have to prescribe two bottles of medicine, my patient may raise a kick at the cost and I'll lose him."

That is just what 90 per cent. of the sanitary engineers are doing to-day. They simply prescribe a bath room, sink and laundry tubs as the only requirements necessary to the completion of a sanitary home. They are not sanitary engineers in the fullest sense of the word, because the home they hand over to the owner is not a sanitary home if there's any possibility of dust entering it, and no provision made to clean the dust out thoroughly.

No one will claim that any home is absolutely free from dust, and no one can claim that a broom will clean dust up, or that it is a sanitary appliance. But every one will admit that vacuum-cleaned homes are as sanitary as it is possible to make them, providing also these homes are equipped with those sanitary appliances which are all well known to the trade. The question resolves itself into one of two things. Is the trade going to claim the title of sanitary engineer, and not strain every nerve to make our homes as sanitary as science can, by their aid, make them? Or, are sanitary engineers fully convinced of the dangers of a dusty home or building? We believe that just as soon as sanitary engineers can be, one and all, convinced of the fact that a stationary vacuum cleaner is just as desirable in a home as a w.c., just so soon will they begin and advocate the need of vacuum cleaners.

Such being the case we intend to show how very essential it is that every home be free from dust, by quoting from various scientific works.

The following is reprinted from "Harmsworth's Popular Science," and is written by Professor Saleeby, one of the greates authorities of the day on the human being and health.

> "Dangerous microbes can flourish in the open air. But they must take the precaution of being safely housed inside the body of some insect.
>
> "If not so housed, they cannot flourish in the open air.
>
> "It means too much oxygen for their tastes, too much movement — whereas what they like is to find some suitable matter to prey upon, and to stay there —and above all, it means exposure to direct sunlight,, which is rapidly fatal to all forms of parasite life, microbe or other.
>
> "Microbes have no wings, and cannot fly; and all the old views about airborne infection, in which the public believe, and which were taught to medical students less than a decade ago, must be abandoned.
>
> "What we have so long called airborne infection is almost always insect-borne or dust-borne. As for infected dust, which is a real danger, one grain of it in a room is more to be feared than a thousand grains out of doors, simply because such dust-borne microbes cannot exist."

It is not so much the actual air we breathe that makes for good health, as the absence from the air of dust-laden germs.

Many a person has been heard to say that too dry a summer is not healthy. One year in England the weather was very dry. Vast numbers of babies died, and it was generally believed that this was due to the prolonged drought, the prolonged heat and the absence of rain. Nothing was further from the truth. The real trouble lay in the fact that there was no rain to wash away the dust and that dust and flies between them infected the babies' milk, and the dust-borne air, infected with microbes was breathed by the babies with fatal results.

It is not so much the temperature or even the dryness of the air, as the dust-laden air that causes trouble. The discovery of the microbe of consumption and its conveyance by expectoration and hence by dust, from the sick to the healthy is of no less importance than the part played by the mosquito in connection with malaria.

To abolish dust from our homes means much. It means that we should thereby abolish the worst microbe breeding matter in existence, and nothing can do this work as effectively as can the vacuum cleaner.

When a stationary vacuum cleaner is installed in a home, it not only sucks up the dust, but also draws up a certain amount of exhausted air, while the dust is collected in the machine below. No filthy bags to clean out and shake every little while, and no fine dust particles which even during the use of the average portable cleaner must escape back into the room being cleaned!

The stationary vacuum cleaner, when in operation, creates a certain amount of vacuum in a home which means that there is less resistance to the entrance of the outside air, which renews the air in the home. This alone is a very important point, as any bacteria germs thereby stand less chance of existing. With a small portable machine, however, the

same favorable conditions do not obtain.

It might perhaps be argued by some that the stationary cleaner is too costly, that a portable machine is now almost within the reach of all, and so on. But the advocate of a stationary cleaner can answer that—the same thing applies to stationary w.c., baths, etc.

Look at the portable so-called odorless sanitary closet. Are there any persons who will question the cost of the stationary w.c. and point to the cheaper odorless closet?

The cases are very similar. There are thousands of landlords who would not instal the now standard bathroom and w.c. if the law did not compel them to do so. The same with the stationary vacuum cleaner. Once the people are brought to realize the necessity of such an appliance being installed in every home when the home is first built, the question of first cost will never be raised, and it is the bounden duty of every sanitary engineer to educate the public to the need of such an appliance. But if the sanitary engineer fails in his duty some other craft or branch of trade will step in and do it for him, thereby reaping the benefits which may be his for the asking.

Aylmer's New Filtration Plant

Plans Approved and Tenders to be Called For—Completion Expected for Next Spring

THE new water purification plant for the Town of Aylmer, plans for which have been completed, tenders to be called for at once, will be a work of great interest, not only to all the towns on the Ottawa River, but also to the many other places which are now faced with the urgent problem of a pure water supply.

The new plant is being put in under the direct mandate of the Board of Health of the Province of Quebec, it having been ascertained that the raw water of the Ottawa now supplied to the town is so badly contaminated that, under conditions favoring the spread of disease it is dangerous to the public health. The water now supplied is chlorinated, and the town is temporarily free from epidemic diseases, but it is deemed safer to instal a filtration plant.

The new filters will be built in connection with the present pumping plant, and it is expected that at the same time electric pumps will be installed, thus saving a heavy charge for coal, which has hitherto made the water supply expensive in operation.

The system adopted is that known as rapid sand or mechanical filtration. A new feature in the Aylmer plant will be the use of crushed marble with the sand in the filtering beds. The presence of the marble in the filtration beds is expected to correct an excess of either carbon dioxide or free alum, should such exist.

The water, pumped from the present source of supply, will first enter a coagulation basin. This receptacle will be large enough to contain a six-hours supply for the town. Coagulation will be effected by the use of alum or other agent in the customary way. From this preliminary process the water will pass to the filters. These filters are three in number, with an area of 125 square feet each. It is estimated that two of them are sufficient to filter all the water required by the town at present. Having been filtered, the water will pass into a clear water basin. Here it will be subject to chlorination or other chemical treatment as may be necessary.

The estimated cost of the work is $35,000. Debentures will be issued for this amount. No vote of the people will be necessary to authorize these debentures, so that no question of public opinion intervenes. It seems manifest, however, that were a vote necessary, a large majority of the ratepayers would favor the expenditure. It is understood that several prominent financial firms have offered to take the whole block of bonds at rates very favorable to the town.

The engineering work is in as competent hands as can be found in Canada. The plans and specifications have been prepared by Mr. Jas. O. Meadows, of Montreal, formerly sanitary engineer to the Quebec Provincial Board of Health, but now engaged in a general consulting practice, and also in charge of the water purification and supply operations of the Montreal Water and Power Company, which concern supplies a number of the independent municipalities within the limits of Greater Montreal, including Westmount, St. Henri and Maisonneuve. Mr. Meadows gained his reputation and experience largely in connection with the successful work of sanitation and water supply in the Panama Canal zone, where he held an important position under the world-famous sanitary specialist, Surgeon General Gorgas. The work of local supervision of construction will also be in competent hands.

As everything is ready, it is expected that construction will begin as soon as the contract has been awarded. The work is expected to occupy seven or eight months, so that by the spring of 1917 Aylmer should be able to count on having as perfect water supply as any place in Canada.

Considerable extensions of the waterworks mains are under contemplation, for some of which petitions are now before the Town Council. The great increase in the summer population in recent years has made the water question a very serious one for several important sections. The multiplication of wells is not looked upon with favor by those best able to advise in such matters, and the supply from the river is not regarded as safe. Now that the town is to have a sure supply of good water, it is felt that the extension of the system will not only directly benefit the new users, but will assist in safeguarding the health of the whole population. Under the energetic administration of Mayor De Bruyne and the present progressive and united Town Council, it is practically certain that every demand for waterworks extension will be met just as rapidly as the means of the town will permit. Three principal extensions of the waterworks system are now under general discussion—one to the Cedars, Echo Bay, and as many as possible of the summer cottages at the north end of the town; one down Mountain Street to Wychwood; and one down Jubilee Avenue. The authority of the ratepayers will be necessary for these works, and the present plan is to submit a by-law to be voted on at the time of the regular elections in January next. Should the expenditure be authorized, the money can be raised and work proceeded with and finished during the winter.

The effect of these improvements will be to add greatly to the attractions of Aylmer as a place of residence, especially for those who wish to provide themselves with summer homes within easy reach of the city. It will also add to the advantages of the town as a location for new industries.

INTERESTING FACTS ABOUT THE CANADIAN NATIONAL EXHIBITION

Though the Canadian National Exhibition only dates back to 1879, the first exhibition, from which the C.N.E. grew, was established in Toronto in 1846.

The first electric railway in America and the second in the world was operated at the Canadian National Exhibition.

THE SANITARY ENGINEER

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VOL. X. AUGUST 15, 1916 No. 16

CHARTERED ENGINEERS

IN the *Engineering Review*, a paper published in London, England, a very interesting atricle appears under the above heading. The writer of the article certainly deserves credit in no small degree for the way he handles the subject. He points out there are hundreds of men who claim the title of "Engineer" who should never be allowed to, and goes on to say that after suggesting that the Institution should be granted a Charter, "so as to improve the status and training of electrical engineers," the Council proposes a Central Engineering Board, nominated by all the important Institutions, to lay down the qualifications in technical training and general education which men must attain before they shall be entitled to describe themselves as engineers. The specific intention is to place engineers on the same level as doctors or solicitors.

This is a proposal with which every genuine engineer will spontaneously sympathize. No word is more prostituted in daily use than that of engineer. It is used by men whose qualifications do not rise far beyond the possession of a slide rule and a taste for Scotch whisky. "Heating and Ventilating Engineer," "Sanitary Engineer," and "Electrical Engineer" are written on the shop windows of ironmongers and undertakers. The man who looks after a miniature electric light plant shares the title with Parsons. But while the scandal is naked and unashamed it has become so familiar a part of our daily life that it will be hard to destroy. The essential trouble is that the word engineer covers a multitude of qualifications.

There are many sections of engineering, and many divisions in each section. Unless the specifications of the Central Engineering Board were very broadly drawn, they would not meet the case; and if they are broadly drawn, they lose the definiteness which attaches to the title of doctor or solicitor and gives the public a clear picture of the qualifications implied. Again, there are many engineers who are deficient in "general education" as generally conceived by examining Boards; they are men of native talent, who have risen from the bench with the aid of inventive faculty or mechanical sense. There are also some born engineers who would find it difficult to pass professional examinations in the subjects upon which they specialize. It is possible that such men are in a minority; nevertheless there is a definite risk that the granting of charters and the reservation of the title "engineer" to qualified members of the chartered bodies will lead to the supremacy of an exclusive professionalism. In matters so formal as law and accountancy the risk is not serious; in medicine it has shown itself to be formidable enough, producing a rigid caste which is impatient of heresy; and in engineering it might well be more serious.

This, no doubt, is a big question but in Canada it is being handled fairly well in connection with sanitary and heating engineering.

When Canadian plumbers assumed the title of sanitary engineers it was not with a view of becoming an exclusive class, but was rather due to an awakening to their responsibilities. The tinsmith, the hardwareman or any other person who claims the title of sanitary and heating engineer will have to deliver the goods if he is to stay in business for any length of time, and while we know that there are here in Canada hundreds who do call themselves sanitary and heating engineers and are unworthy of the name, we are sure that they will soon pass out as unfits simply because they cannot exist long.

What we require in Canada along this line is not so much severe technical examinations as results. Our government should put into being a Federal Department of Health, include heating, lighting, ventilating and sanitary systems and set certain standards by which such work should be governed, and then so long as the man can "deliver the goods" an examination full of technical phraseology would not be necessary.

BEATS ESTIMATING FREE

ONE of the readers of THE SANITARY ENGINEER paid us quite a compliment for taking the stand we are doing against "Estimating Free" and stated that he never estimates on work unless he is at least paid for his trouble. He then went on to say that some years ago he was told that if he cared to estimate on a certain job he could. The value of the work would probably amount to $1,500.

He refused to do so, but said more in a joke than anything else that if the owner cared to have him layout the work he would do it for $150 providing he was not the successful tenderer, but in case the work did not come his way he would superintend it. The offer was accepted, and Mr. Sanitary Engineer made $150 which only required four visits to the job and a day or so preparing the plans.

There's no denying the fact that the advice of a sanitary and heating engineer is just as valuable to the person who solicits it as is the advice of a lawyer or doctor. Neither of the latter profession hand out estimates free.

Rural Sanitation

A Continuation of the Sanitary Science Course That Has Been Appearing in the Sanitary Engineer, But Having Particular Reference to the Sanitary Disposal of Household Wastes in Unsewered Districts

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 8

The Amount of Tile

IT is probable that on no point connected with the sub-surface irrigation method has there been more difference of opinion than on this—the amount or length of tile required.

Syphons as now manufactured—even the smallest or three-inch size—discharge over one gallon per second, and in less than two minutes the average-sized dosing chamber would be emptied. Such a short period of time provides but little chance for much of the liquid to soak away into any but the most porous of soils. If the action of the syphon is not to be hindered, it seems very reasonable that the amount of tile should be enough to provide a capacity equal to that of the dosing or discharging chamber.

But Col. Waring, who first introduced the sub-surface irrigation method in America, has given it as his opinion that "in a reasonably porous surface loam it will suffice to have one foot of tile for each gallon (U. S.) of the discharging chamber." He advised up to three feet of tile per gallon in heavier soils, but apparently had reference to only two-inch tile.

Table I. gives the calculated capacities (with no allowance for seepage or soakage) of runs of 2-inch, 3-inch, 4-inch and 6-inch tile, allowance being made for ¼-inch joints.

TABLE I.

Amount of Sewage.	Number of one-foot lengths of tile 2-inch	3-inch	4-inch	6-inch
1 cu. ft. requires	45	20	11¼	5
1 Imp. gallon requires	7 1-5	3 1-5	1 4-5	4-5
1 U.S. gallon requires	6	2 2-3	1½	2-3

In a cubic foot there are approximately 6¼ Imperial gallons, but 7½ United States gallons. Tables and books published in the United States have reference to the U. S. gallon, while in Canada, as in Great Britain, the Imperial gallon is the legal measure.

It would appear that when it takes 6 lengths of 2-inch tile to accommodate 1 U. S. gallon, that from 1 to 3 lengths, as advised by Col. Waring, is almost out of the question. Other opinions besides the Colonel's have, however, been given to the effect that the tile need not equal in capacity the flush tank.

"Sufficient ramifications and length of pipe must be provided to give a capacity of at least one-half that of a cesspool or tank to be discharged; the other half is generally soaked away during the flow." (Extract from an engineering magazine published in the eighties.)

"Ordinarily it is safe to have about one foot or slightly more of four-inch

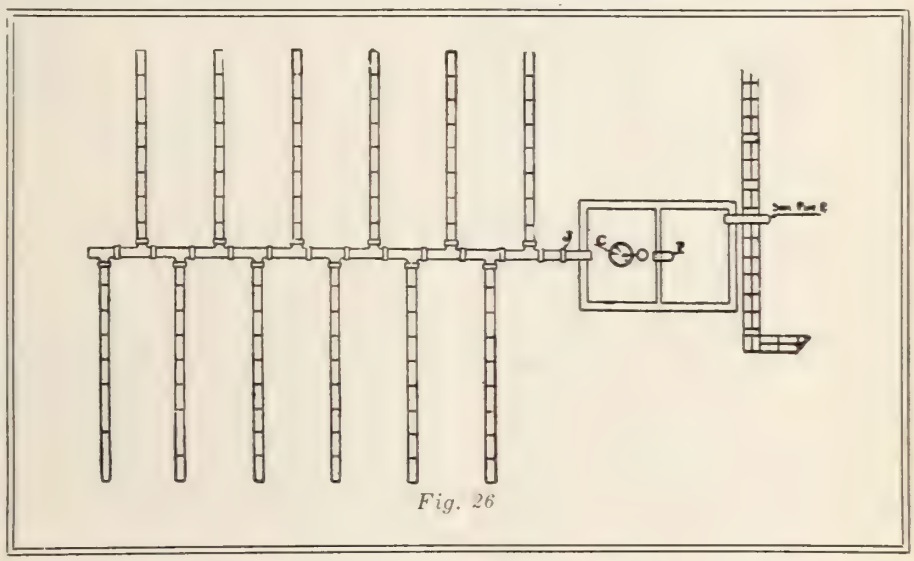


Fig. 26

disposal tile for each gallon of sewage expected daily. The capacity of the dosing tank may exceed the total volume of the disposal tile by from ten to fifty per cent., as a large part of the sewage rapidly escapes into the soil while the remainder is flowing from the syphon chamber." (From bulletin prepared by the North Carolina State Board of Health, Raleigh, N.C.).

The best modern practice is to follow the rule, which if it errs at all is on the side of safety, to **provide a sufficient number of tiles to equal the capacity of the flush tank.** If 4-inch tile are used it is generally figured that two lengths are required for each Imperial gallon, or thirteen feet for each cubic foot of sewage in the dosing chamber (for exact amount, see table I.).

As to how many times a day a syphon should empty the dosing chamber is another matter on which opinions differ. From one to three times per day is, however, advocated by different writers. In heavy soils once a day seems the best practice, while in light soils twice a day or every twelve hours could be safely permitted, and there would be required from this cause only half the amount of tile. In this connection Mr. M. J. Quinn in his paper of some years ago on "A Perfect Sewage System for Rural Homes, Schools and Factories"—which paper, by the way, is one of the best short papers on sub-surface irrigation that the writer has read—has stated in regard to the discharging or flush tank, that it takes from twelve to twenty-four hours to fill; or, in other words, it is discharged in from twelve to twenty-four hours. Colonel Waring also stated that the discharging chamber should be made large enough to hold the product of at least twelve hours, that there is no objection to its retaining twenty-four hours' supply, but that a longer retention would lead to too much putrefaction.

In regard to the amount of tile required, Col. Waring's original statement has been and is still quoted in part by many writers in the United States on the subject of sub-surface irrigation, who advise one length of tile per gallon in porous soils up to three lengths of tile for heavy or clayey soils. Reference to the dosing chamber is not made, however, and one can assume that it is the

total volume of sewage that is meant. Also 2-inch tile is not advocated any more, and it is generally 3-inch tile to which such writers refer. From the table referred to it will be seen that one U. S. gallon of sewage requires 2 2/3 lengths of 3-inch tile. In heavy soils, therefore, if 3 lengths were provided there would be more than ample to take care of the flow from the flush tank syphoning once in twenty-four hours, which, as mentioned, is for heavy soils a satisfactory arrangement. In light soils, if only one length per gallon per day of sewage is allowed, then the syphon would have to act 2 2/3 times per day, or about every nine hours, if the capacity of the flush tank is to be provided for. For light soils this arrangement is advised by some writers.

Having arrived at the conclusion that the amount of tile required should at least have a capacity equal to that of the flush tank, the next point (and one which is really more important) is whether a sufficient area of soil is provided by the use of that certain amount of tile to allow of a satisfactory bacterial action in purifying the sewage. To quickly demonstrate the point, suppose 12-inch tile in one-foot lengths with open joints were used, some 15 lengths or so would be sufficient in an average case to take care of all the sewage in the flush tank. Yet the sewage could only get out at some 15 open joints, which would result in clogging and the sewage not being purified. On the other hand, if 2-inch tile were used about 540 lengths (no allowance being made for seepage) would be required to take care of the flow from the tank. One can imagine with such or greater lengths it might be possible that not sufficient organic matter would be delivered at each joint to allow for a vigorous bacterial growth and action.

It is also possible under certain conditions that from different households, though with the same number of people, the volume of sewage from one house might be twice that from another. However, the amount of organic matter is the same in both cases; and the area of soil necessary to purify the sewage might be almost the same in both cases. In considering the purifying action of the soil when sewage is disposed on it in different ways, it is, therefore, to a large extent the number of people contributing as well as the amount of sewage per person—which may vary—that is counted on.

A knowledge of the area of soil required in other methods of treating sewage on the land is some guide to the area required in the sub-surface irrigation method.

Broad irrigation or sewage farming consists in flooding an area of land by means of ditches or channels at varying periods averaging less than 30 days. The sewage is applied on the surface and gradually soaks away into the soil.

For various reasons, which need not be taken up here now, broad irrigation is not practised as much as formerly. Where the method is used it has been found by experience that for towns and cities one acre of land can take care of the sewage, from 100 to 200 people depending on various conditions of soil, etc. It has, however, been stated by one writer that at least one acre of land is required in treating the sewage from only one private household. On account of the probable proximity of the area being irrigated, offence to the senses might occur if a smaller area were used.

If the ordinary soil is replaced with sand beds and the sewage applied in doses to these sand beds every day or so, and periods of rest between the dosing allowed, then the broad irrigation becomes the intermittent sand filtration method. By such a method of frequent intermittent application, plenty of air is supplied to the beds, with the result that one acre of sand beds will satisfactorily treat, on an average, the sewage from 1,000 people.

The sub-surface irrigation method has the great advantage for private residences that there is nothing above ground to offend the senses in any way. When a syphon is used, intermittent application of the sewage is obtained, and results for that reason more like the intermittent sand filtration than the broad irrigation method may be expected. It is very seldom, however, that much sand is found in the area around a residence, so for that reason results as good as the intermittent sand filtration method are not obtained. The American Civil Engineers' Handbook gives the number of people contributing with safety to a sub-surface irrigation as from 150 to 250 per acre.

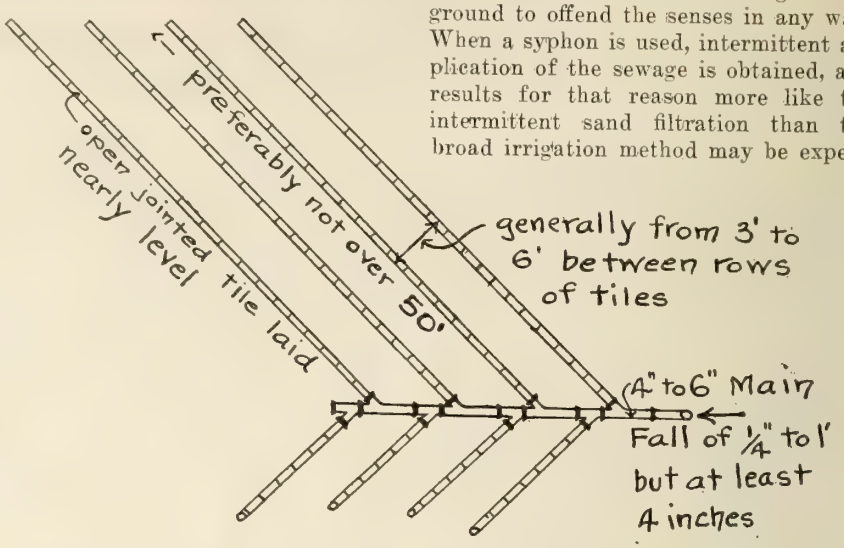

preferably not over 50'
open jointed nearly level tile laid
generally from 3' to 6' between rows of tiles
4" to 6" Main
Fall of 1/4" to 1' but at least 4 inches

FIG. 27

Fuller in his book on "Sewage Disposal" puts it something like this, that from 20 to 100 feet of tile per person may be required, depending on the condition of the soil. Such a statement has no necessary reference to the size of the tile, nor does it take into account the capacity of the flush tank; it has reference merely to the fact that a certain length of tile is required to provide for the escape of sewage at a sufficient number of joints to distribute the sewage over an area such that purification can

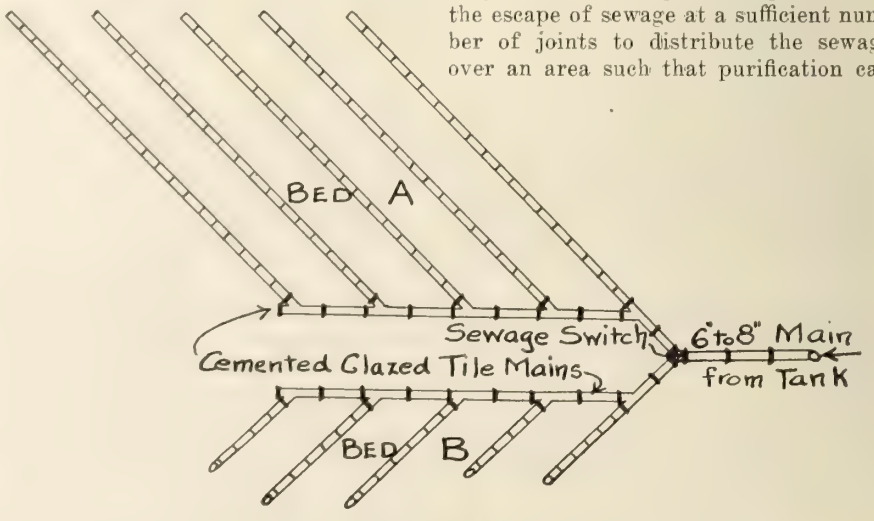


FIG. 28

be accomplished. The statement that 1 foot of tile per U. S. gallon of sewage is sufficient in porous soils, while 3 feet per gallon is necessary in heavy soils, is a statement of the same nature, the main point involved being that the area of soil supplied will be sufficient for purification.

The writer believes, however, that such a statement as: "Twenty feet per person is recommended in light sandy soil, and as much as fifty feet per person may be required in heavy clay soil," may be misleading, especially if smaller tile than 4-inch are used, and if it is not specifically stated that the tile should, in any event, allow for the full capacity of the flush tank.

It has been found that if the capacity of the flush tank is provided for by a sufficient number of 4-inch tile, that fortunately, that number of the tile will ordinarily be sufficient for satisfactory bacterial purification. Allowing 20 gallons per person per day as the amount of sewage to be expected from a frugal rural household, then 40 feet per person will take care of the sewage in average soils, when the syphon is flushing once a day. Only 20 feet of tile per person might be required in light sandy soil with the syphon flushing every twelve hours. When more than 20 gallons per person per day is used more tile are needed, and as only the same amount of organic matter is delivered to them, the work for the bacteria distributed along the longer length of tile is easier.

Figs. 26, 27 and 28 show various arrangements of the tile for sub-surface irrigation in level ground. The length of each "run" of tile should not as a rule exceed fifty feet, but is generally made less than that amount. The disposal field shown in Fig. 28 is adapted for heavy soils or large systems. A switching device is provided by which the sewage can be made to flow, intermittently as usual, but only into the tile in Bed "A" for, say, a week. Bed "A" is then allowed to rest for a week while the sewage is switched to Bed "B."

As to the widths between runs or rows of tile, here again varying advice has been given, and anything from 2 feet up to 15 feet can probably be found advised in print somewhere. Four feet is probably a good average for all soils. Some writers advise 3 feet apart in sandy soil and about 5 feet in heavy or clay soils. Others advise around 6 feet in sandy soil and allow for less, or 4 feet, in the heavy soils. The writer agrees with the latter opinion: in sandy soil less length of tile is needed, because the sewage spreads out well from the tile, requiring a greater width between rows than in the case of clayey soil, where a greater length of tile has to be used due to lack of porosity in the soil.

(Continued in next issue.)

PUBLIC COMFORT STATIONS

(Continued from page 12.)

tories, maps and city guides may be had. It goes without saying that the utilities mentioned should in no way interfere with the primary object of the station, but there is no reason whatever why they cannot be included without this interfering.

In the question of maintenance the small-type stations again offer substantial advantages, for only a minimum of attendance is necessary, and one porter can quite well be required to take care of a number of stations.

The above facts, borne out by experience, deserve to be taken into serious consideration wherever a city contemplates the introduction of comfort stations.

"ESTIMATES FREE" COST SOMETHING

Once upon a time, in a certain city, six sanitary engineers heard of a certain job. They started the wheels of action in motion in an effort to secure the work. Each had advertised and printed on his stationery that it was "no trouble to make an estimate." The bargain hunter who was building this particular house had taken them at their word.

With sharpened pencil each sanitary engineer figured and trimmed and burned the midnight oil, with enough rumors of what his competitors were doing to urge him to redouble his efforts. Each man in his heart began to feel that the other five were robbers, commercial pirates and enemies of law and order.

The day arrived for opening the bids and each had the satisfaction of confirming his opinion of his fellow craftsmen. The bargain hunter with a knowing smile confirmed this opinion also.

Within the course of the next few days, each bidder had an opportunity of taking a private peep at the prices of his competitors. Then a second set of bids was asked for, and a second shaving and sweating of prices followed. At this stage a seventh plumber entered the lists.

Once more with due ceremony the bids were opened. The seventh man had won the contest.

With one accord, the six arose in anger and dismay. They denounced the successful bidder as a common enemy, a disturber of the peace and the dignity of the craft as well as being a candidate for the booby hatch, if not for the chain gang.

For hours they checked and rechecked their estimates, each man proving conclusively that by all the laws of guesswork and other figures he should have had the job; for if proving nothing else, his estimate insured a net loss.

So, with one accord they waited on the successful bidder to ascertain on what basis he had calculated his figures.

There stood the figures in black and white. Labor about so much, soil pipe so much; threading pipe so much; overhead so much. There were figures representing various other items involved.

But nowhere on the whole estimate was there an item showing cost of closets and lavatories.

"What did you figure for those?" asked the six.

"Those!" answered the lucky bidder. "Why, I have a whole cellarful of closets and lavatories that I bought and paid for last year. I didn't have to buy them like you other fellows."

Does it seem a little far-fetched? Of course it does. It is only drawn from the imagination, but with many concrete examples of plumbers doing none of their figuring based on facts. And that's just what makes it so hard for the real sanitary engineer who does know his costs and how to figure a job so that he can show a profit. He becomes discouraged through seeing job after job get away from him. Why not cut out the generosity in making estimates and not advertise the fact that they are so easy to get.—Sanitary Pottery.

EXHIBITION NOTES

The permanent buildings at the Canadian National Exhibition cost over $2,500,000.

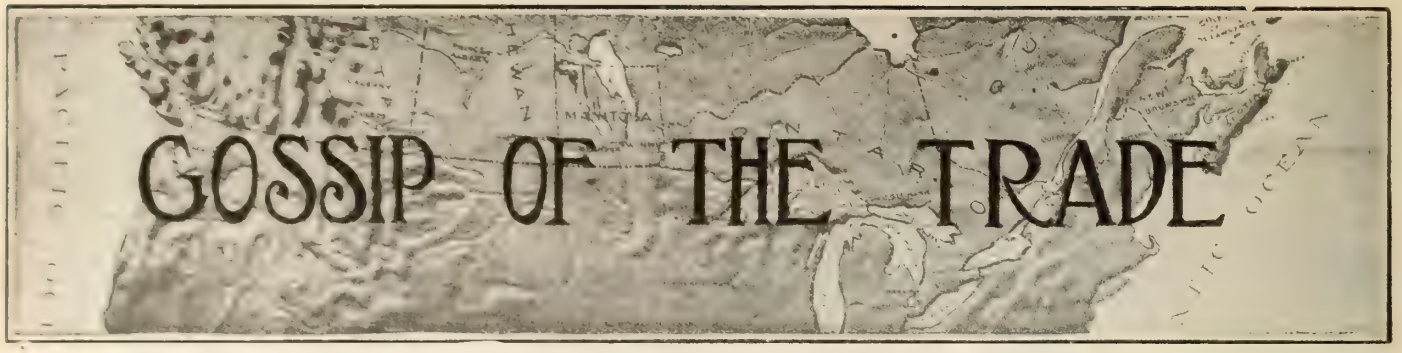
The Canadian National Exhibition was opened on one occasion by a woman, Lady Kirkpatrick performing that function in 1897.

In the first few years of the Canadian National Exhibition the bulk of the crowds were carried to the grounds by ferries running into Dufferin street slip.

Legislation was once threatened to prevent Toronto holding an Exhibition except in years specified by the Ontario Government. Fortunately the matter never reached the House.

The attendance the first year of the Canadian National Exhibition was 101,000. It ran three weeks. Last year there was a daily average attendance of 72,000 for 12 days, a total of 864,000.

Like many other successful institutions, the Canadian National Exhibition was in financial straits many times early in its career. On one occasion one of the directors gave his personal note for $10,000 before the gates could be opened. Now it pays an annual surplus to the City of Toronto.



NOT GUILTY.

W. L. Parrish, Port Perry, who was charged with speeding by Constables Cave and Mallon pleaded that his car has not been in Hamilton in three years. Mrs. Parrish and another witness corroborated his statement. The Judge was convinced that it was not Mr. Parish's car which had been speeding, but the police are positive that they have the correct number, although they admit that the car they saw was a roadster, while Mr. Parrish' car is a five passenger car. His worship is under the impression that the number of the car the police saw was a fake number. Mr. Parrish was awarded $23 expenses.

TORONTO VISITOR

One of the old guard from Kingston, D. Hall, and his daughter, paid a visit to Toronto on their return journey from the Muskoka Lake district, where they have been spending a well-earned vacation.

Mr. Hall enjoys the confidence of a large number of Kingston's citizens, and has been in one establishment for over thirty-two years, which fact alone speaks well for him. The Sanitary Engineer sincerely trusts that Mr. Hall will continue to enjoy all the good things [illegible]

Prize winners at the recent Toronto Society picnic. J. E. Cooper, Junior, of Toronto, standing in the centre saluting the march past of the boys on the island.

Toronto Society Annual Picnic

An Ideal Day—Neither too Hot nor too Cold but Just right—Everybody Turned out That Could and Did Justice to All That Came in Their Way.

"ALL work and no play makes Jack a dull boy," is surely the picnic motto of the Toronto Society of Sanitary and Heating Engineers. It was without doubt a bigger crowd this year than any previous year that took in the annual picnic, which took place Tuesday, August 1st, at Centre Island.

The weather was ideal, the ground was good, and the games, too, were splendid. The little tots who ran races and took part in the various events certainly had the time of their life, and every one came out prize-winners. Not a blank in the bunch.

The ladies! My! They are certainly anything but quitters, and the way they raced over the green sward was a sight for sore eyes. Who said egg race? That was "some race." Talk about putting one over on the men. Why, the egg racers certainly tried it hard, but it

Members and friends at the Toronto Society of Domestic, Sanitary and Heating Engineers at Centre Island enjoying their annual picnic which turned out to be one of the best attended since the society was formed.

didn't work, because the rule of the race was: "Simon says thumbs up," and quite a few put thumbs down on the egg. So the eggs had to take another run.

Some of the boys took to wearing a new kind of tie, more like a halter in that event called the tie race, and the winners were all entitled to, as well as awarded, a bundle of new mown hay.

Of course, there were several home runs for both teams in the baseball game; but in spite of the weight taken on by the sanitary engineers, the game ended in a draw.

It was rumored that the supply men intended putting it all over the Toronto boys, but Jack Bruce wouldn't hear of it. He felt kind of good, and, as is usual with Jack, intended to see fair play, which he did.

The two F's were there as large as life, at least Frankland was large, and Fullerton, while not so large, was all over the field at once keeping "a steady stream of pure ice cream" flowing all over the place.

Who in the world could imagine a Toronto Society picnic without Fullerton and Frankland; it would be a fizzle. Bad enough not having John Wright, Fred Waterman, Kirtley, Ferguson, and a few more of the old guard, though they were all at the picnic in spirit, no doubt.

The big event, last but not least, that of the 500 yards all-comers' race. "The best race ever" was the remark some of those present made, and without doubt Dave Menzie certainly made a long streak across the grass. Tom Longboat wouldn't have had a look in on that race. The cups were won:—First prize, Dave Menzie; the second by ———.

These cups were donated by the B.O.T. Manufacturing Co., Toronto, who for a number of years have presented a similar pair of cups to the winners of this race at the annual picnic.

Baseball players of the Toronto Society & Manufacturers at the recent annual picnic. The fellow in the centre is giving a splendid rendering of Home Sweet Home with original variations.

Gas Users In Toronto.

There are 46,000 gas stoves in use in Toronto, out of 102,548 gas users. The other 56,548 use gas for either gas water heaters, furnaces or light. The above figures prove that there is still a lot of business for the sanitary and heating engineer, if he will suggest to the owner of a house that his house should be piped for gas. There's real service in the suggestion and business in the installing of piping as well as appliances. No house should be built that is not furnished with gas mains. Electricity is subject to every storm that blows, but very seldom is the gas turned off.

During the week of July 29th and Aug. 1st the "Hydro" lights were out for hours at a stretch, and during dark hours too. Those whose houses were fitted up with gas, had a service right on hand, and no doubt were to be envied by those who were in darkness. The trade is looking for business and if service is combined with the business, then sanitary engineers should get after it good and strong.

REVISING QUEBEC HEALTH LAWS

Sir John Kennedy and Messrs. W. S. Lea, J. O. Meadows, and A. Surveyer, represented the Canadian Society of Engineers as a deputation to the Superior Board of Health of the Province of Quebec, requesting amendments to the Provincial Health Act. It was suggested that at least two engineers should hold membership on the Superior Board in view of the importance of engineering in sanitary undertakings; that plans submitted to the Superior Board should always be prepared by compe-

Members and friends at the Toronto Society of Domestic, Sanitary and Heating Engineers at Centre Island enjoying their annual picnic which turned out to be one of the best attended since the society was formed.

tent engineers; that rules be enacted governing the filing of plans; that extensions to plans should be submitted to the Board as new projects; and that no municipality be allowed to submit projects for waterworks to the electors without first having secured the approval of the Superior Board. Consideration was promised to the suggestions.—Contract Record.

BORDEAUX EXHIBITION

Advisability of Canadians Attending is Pointed Out

The Chambre de Commerce Francaise de Montreal has received a letter from the management of the Bordeaux (France) Exhibition, to be held September 5th to 20th, calling on Canadian industrial establishments to be represented, and pointing out the benefits which would accrue from such an interchange of ideas. The Chambre invites anyone interested to communicate with its office in the Power Building.

POOR PLUMBER

The druggist danced and chortled till the bottles danced on the shelves.

"What's up?" asked the soda clerk. "Have you been taking something?"

"No," gurgled the dope dispenser gleefully. "But do you remember when our water pipes were frozen last winter?"

"Yes, but what ——"

"Well, the plumber who fixed them has just come in to have a prescription filled."

NEWS FROM THE FIRING LINE

The friends of Harry Ruddick will be pleased to know that he has at one jump been promoted from private to sergeant. He was transferred from the Eaton Machine Gun Battery to the 1st Brigade Machine Gun Company, 1st Canadian Division, B.E.F., France, and is now Sergeant H. Ruddick, No. 843.

He writes a very glowing letter of what is being done by the boys; that everybody is in the fight to a finish. He was fortunate to meet Plumbing Inspector Mathews some time ago, who is quartermaster of the Third Battalion, and reports that Mathews is looking well. It's no picnic, of course, though none the less interesting.

The company to which Sergeant Ruddick is now attached is a bunch of fine fellows he says, and the officers were very kind to him right from the start.

No one is more pleased to hear of Harry's promotion than is The Sanitary Engineer. But the stuff is in him, and it simply had to come out. He's a prince of a fellow, and we wish him well and a safe return. We can't afford to lose such fellows; but at the same time it requires just such men to bring this dreadful war to a successful issue. No doubt the peace of this world will be more permanent as a real result of the work of such men as Sergeant H. Ruddick.

Seargt. H. Ruddick, Toronto, now at the firing line "Somewhere in France." Recently promoted from private to Seargent. Mr. Ruddick is a honorary member of the Toronto Society of D. S. & H. Engineers.

ANNUAL DONATION OF SILVER CUPS

For a number of years the B. O. T. Manufacturing Co., Toronto, have donated two silver cups to be given to the winners in a 100 yards all-comers' race. They are a splendid pair of cups and have the names of the winners engraved thereon.

The following are the winners since the year 1914 inclusive:

1914—F. Gentle and A. Farthing.

1915—T. B. Smythe and W. E. Ramsay.

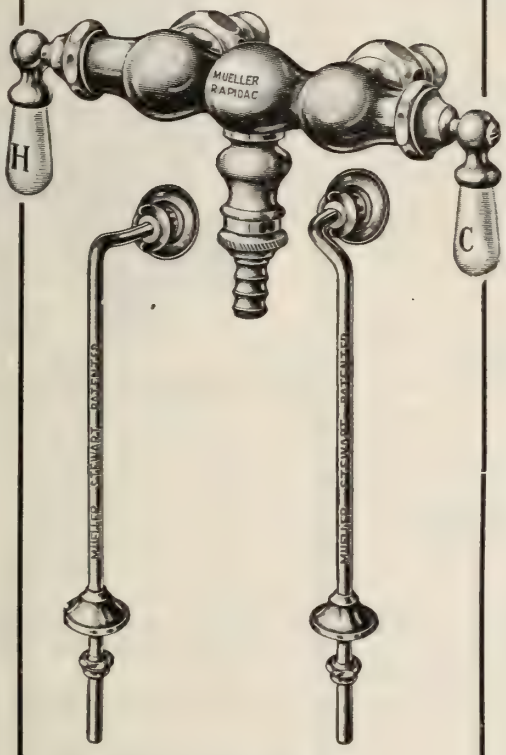
1916—D. Menzie and W. J. Hall.

The accompanying illustration shows the cups donated this year.

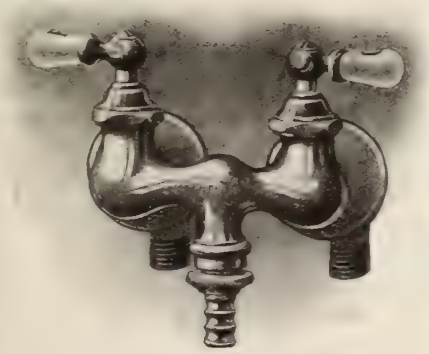
Silver cups donated by the B. O. T. Manufacturing Co., to the winners of the 100 yards race.

PASSED ON

Mr. W. H. Meredith, of 14 Division street, Toronto, passed to the Great Beyond recently after an illness of less than two weeks. Mr. Meredith was born in York County in 1862, but had lived on Division street since he was a boy of 16. He was a son of the late W. H. Meredith, who taught for many years throughout York County. He was secretary for the old Toronto Society of Master Plumbers for a number of years and was highly respected by all. Though in failing health for some time past, Mr. Meredith continued his duties as commercial traveler for the Monarch Brass Co., Toronto, until twelve days ago. He was past master of Lansdowne Lodge, L.O.L, 479; a member of Ivanhoe Court, C.O.F.; a life member of St. George's Society and Broadway Tabernacle, a Conservative in politics, and belonged to the Knights of the Maccabees. Besides his widow, who was Annie, second daughter of the late R. H. Lear, he is survived by two sons—Harry, of Chicago, and Pte. Elmer, now in France with the 83rd Pellatt's Own Battalion; two daughters—the Misses Evelyn and Winnie, of Toronto; and two brothers and three sisters—James D. P. Meredith, of Toronto, Thomas W., of Denver, Col.; Mrs. S. A. Maynard and Mrs. Mary Hall, of Toronto, and Mrs. Frank Hendry, of Mimico.



**Fuller in Design—
Compression in Action**



Two Designs in

MUELLER *Rapidac*

THE MORE YOU KNOW ABOUT BRASS GOODS THE BETTER YOU LIKE

The Mueller Line

One of our customers said:

"My father and I have been in the plumbing business over 25 years and our biggest losses have been caused by troubles with inferior brass goods.

"We are building up a splendid business on quality brass goods. Every dollar we spend with Mueller's is like putting money into the bank with compound interest.

"WE NEVER HAVE TO GO BACK TO REPAIR MUELLER RAPIDACS."

The Mueller Line costs a little more than the ordinary ones — but you buy more quality and more satisfaction.

Sold by all jobbers throughout the Dominion.

H. Mueller Manufacturing Co., Limited

SARNIA, ONTARIO

Question Box

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

SWEATING SOIL AND WATER PIPES

Editor The Sanitary Engineer.

I would like very much if you would publish in your next issue of The Sanitary Engineer an article on the prevention of noise in soil pipes, and also the best covering to prevent sweating of such piping. An architect has almost demanded that I put sheet rubber covering over the pipe. Will sheet rubber remedy matters? What would you suggest? J. H. W.

The noise referred to above we presume is heard when a w.c. is flushed, or when a large quantity of water is flowing down the soil pipes. This cannot be entirely overcome, but to some extent can be remedied by covering.

The covering, if a good quality, will also prevent sweating, but it must be put on in such a way as to make it one continuous piece.

The best covering is either a good thick mineral wool pipe covering or air-cell asbestos, and the joints both at the beginning of the covering and at the end must be made air-tight, so as to seal up the air cells.

Before covering such pipe it should be thoroughly dried, or put on when pipes are not sweating. If regular air-cell asbestos paper is used by wrapping it round the pipes, not less than four-ply must be used. This will be about one inch thick of a cover, and no covering that is less than one inch thick would result in cure.—Editor.

WHAT ABOUT JACKET HEATERS?

Editor The Sanitary Engineer.

In reference to your article on page 28 of your issue of July 15th in reply to an inquiry from some party in reference to the advisability of putting a coil in furnace for heating water for domestic purposes, I note that you recommend the installing of a gas water heater.

My opinion is that it would [illegible] for fuel, will be much more economical than a gas water heater, and it is a well-known fact that there are thousands [illegible]. They are economical, and give splendid results.

SUBSCRIBER READER.

When you say you note the fact of gas water heaters being installed we had in mind many such [illegible] cases where large quantities of water are not in constant demand.

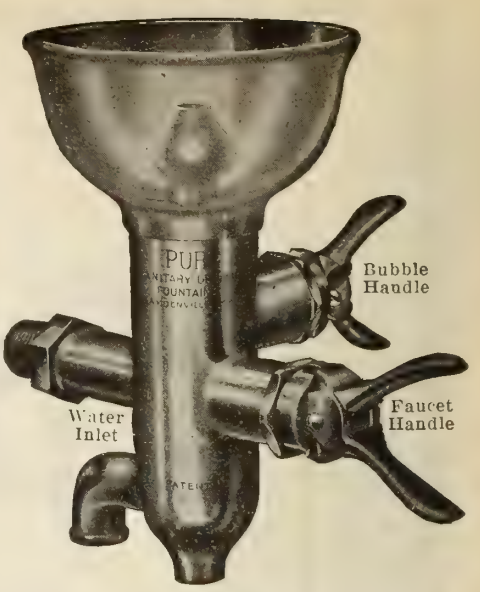
The small jacket heater is an appliance which would be preferred under the latter circumstances. The writer has himself installed large numbers of jacket heaters, and there are innumerable conditions which could only be properly handled by installing either one of these or a tank heater.—Editor.

A SOLDERING AND WELDING COMPOUND FOR ALUMINUM, COPPER AND BRASS.

When the practical men who have to dig from under difficulties accord favor to a new product it properly commands attention. The navy and conspicuous aeroplane and motor car organizations speak most encouragingly of So-Luminum, and we feel its claimed advantages must excite the technical curiosity of our readers.

So-Luminum is a welding compound that sidesteps oxidization in soldering operations. If it did only this when mending aluminium it would have a place in the sun. Its purpose is to replace many of the established processes, accomplishing the work at low heating temperatures that avoid the dangers of brittleness, burning and loss of strength in the metal worked upon. Either aluminium or its compositions are amenable to this new treatment—and it is all done so simply and in so short a time. No flux is used—a most interesting point, and the flame of the ordinary torch is hot enough. This is a very important statement to the practical welder. It is also claimed for the material that it runs at low temperatures, as already stated, but that the weld is both harder and stronger than the aluminium acted upon.

We illustrate a broken and mended crank case to show, for one thing, that building up with So-Luminum makes a very clean job as well as an effective one. In practice it is only necessary, so we are told by the So-Luminum Mfg. & Engineering Co., Inc., the sole makers, to clean the metals with file or brush, bevel the parts to be mended, and well tin the surfaces to be joined, then heat the body of metal well and at same time apply the So-Luminum. This is the simplest operation, but more complex ones are demonstrated daily in the offices of the company at 1790 Broadway, New York City.



Saving or Wasting?

The manner in which you handle the drinking water problem in your plant may seem to be a small matter to you—but investigate. The results will be surprising.

The old-time faucet is costly. Running hour after hour, day after day, its ceaseless flow is costing you money, yet without any better service.

Puro Saves 35%

A Puro Sanitary Drinking Fountain will cut that water bill 35%. We can prove that it has done that for others.

It will give every employee a safe, saner draught of bubbling water free from the contamination of the common drinking cup.

In a word, it is the only sanitary Drinking Fountain that is really safe, sanitary, simple, automatic in control, and easy to attach.

"PURO -FY"

(MADE IN CANADA)
YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company
147 University Ave., Toronto, Canada

CROP PROSPECTS

Every business man is intensely interested in crop prospects in various parts of Canada.

Your decision in many important business transactions during the next few months will hinge on the outlook for a big crop.

The Financial Post has secured the services of F. M. Chapman, Editor of Farmer's Magazine, to give each week, on the front page of The Post, a general review of crop conditions in various parts of Canada.

We are endeavoring to make this the most reliable and up-to-date review of crop situation published in Canada.

The Financial Post is issued every Friday. Subscription price $3.00 per year. $1.50 for six months. Sample copy sent on request.

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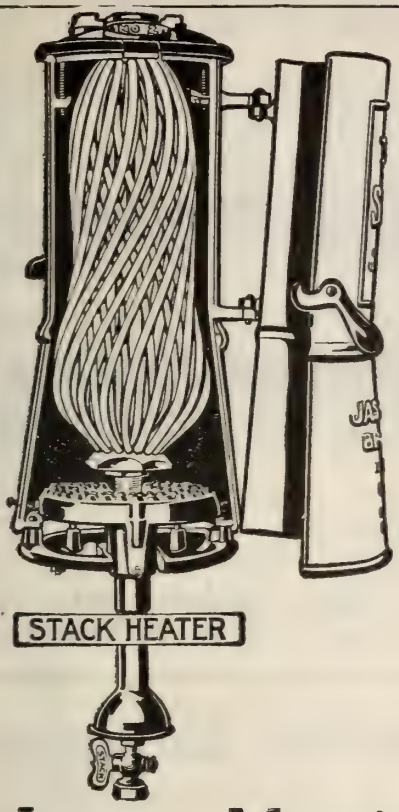


STACK FACTS

From Recent Tests Made by Various Gas Light Companies

The STACK will heat 5 gallons of water 3 minutes quicker than the average heater.

The STACK raises the temperature of 5 gallons of water 28 degrees higher in 10 minutes than the average heater.

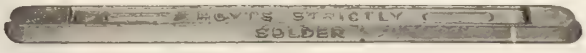
The STACK will heat 3 gallons more in 10 minutes than the average heater.

The STACK shows 15% greater efficiency than the average heater.

James Morrison Brass Mfg. Co., Limited

93-97 Adelaide Street West, TORONTO

Our Mixed Metal Sales Amount to Over $5,000,000 Annually



HOYT'S WIPING SOLDER is as perfect as experience and first class ingredients can make it. As only one perfect Wiping Solder can be made we manufacture only one grade, which must necessarily be Hoyt's high standard of quality.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends. Your orders will have prompt and careful attention, not sometimes—but all the time.

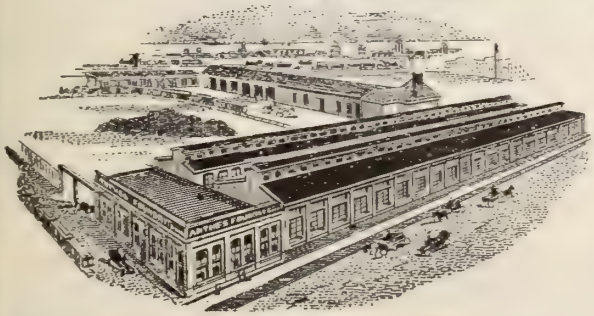
HOYT METAL COMPANY, TORONTO, ONTARIO

New York, N. Y.; London, Eng.; St. Louis, Mo.

TORONTO

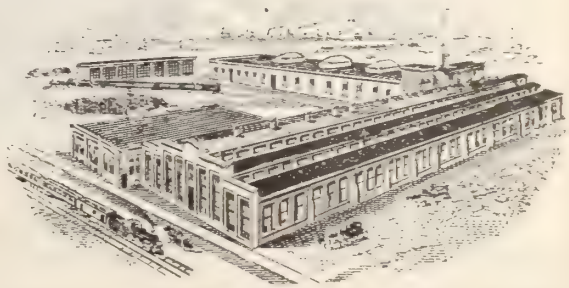
ANTHES FOUNDRY LIMITED

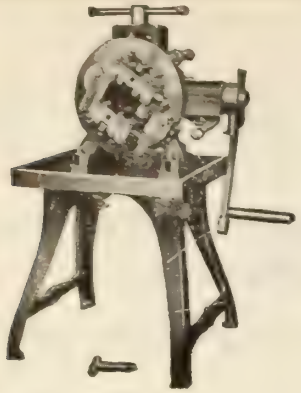
WINNIPEG



MANUFACTURERS OF

CAST IRON SOIL PIPE AND FITTINGS





No. 00

PIPE MACHINES

Either Hand or Power

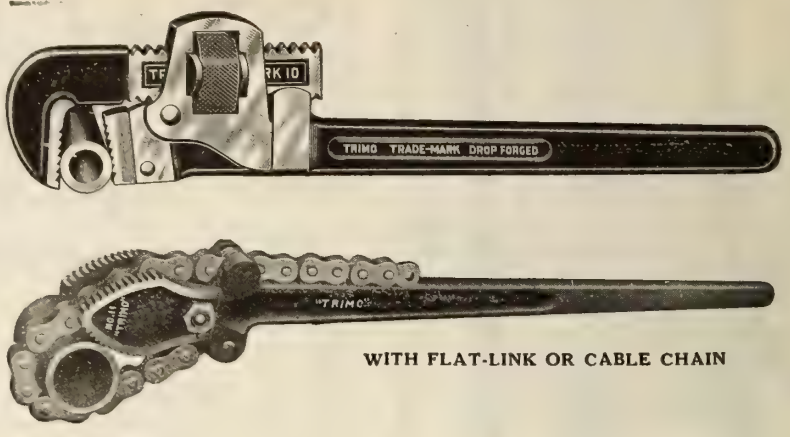
This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
A time and labor saving machine.

Manufactured by

THE ARMSTRONG MFG. CO.
317 Knowlton Street
BRIDGEPORT, CONN.
WRITE FOR CATALOGUE

World-Famed Specimens of the Age of Steel

TRIMO



TOOLS

WITH FLAT-LINK OR CABLE CHAIN

Send for Catalog No. 91

MADE BY

TRIMONT MFG. CO., 55 Amory Street, Roxbury, Mass., U.S.A.

Consulting Sanitary Engineer

Advice and Plans on Water Supply and Sewage Disposal for Residences, Factories, etc.

H. L. SEYMOUR, B.A.Sc., A.M. Can. Soc. C.E. Box 95 Sanitary Engineer TORONTO - ONTARIO

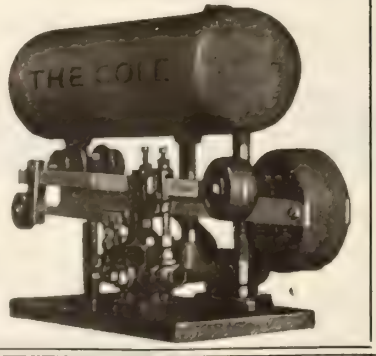
R. O. Wynne-Roberts

Consulting Sanitary Engineer

310 TEMPLE BUILDING, BAY STREET TORONTO

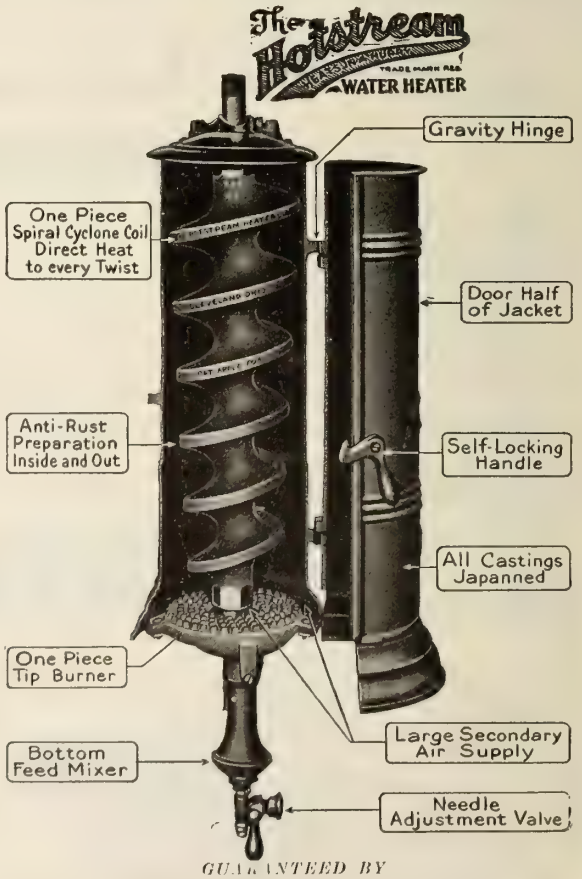
Water Supply, Sewerage, Sewage Disposal of Cities, Villages and Institutions.

THE "COLE" STEAM TRAPS STAND FOR ECONOMY AND EFFICIENCY



We feel we are not out of our sphere when we say if you should want time to investigate the merits of our products. Can we explain to you more fully? If so, drop us a line.

GEO. W. COLE CO.
838 Dundas St., TORONTO



GUARANTEED BY

THE HOTSTREAM HEATER CO. - CLEVELAND

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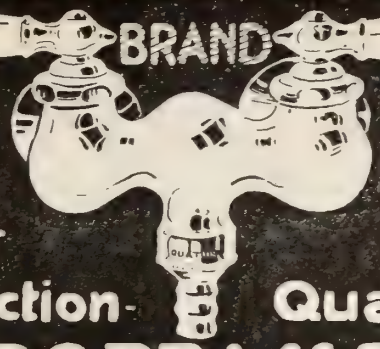
"When writing advertisers please mention that you saw their advertisement in the SANITARY ENGINEER."

SYDENHAM BRAND QUATURN



Highest Quality
Beautiful Design
All Working Parts of
Identical Construction-

Has Interchangeable Bronze Seat
Write for Our New
Quaturn Catalog.

WALLACEBURG BRASS & IRON MFG. CO.
WALLACEBURG ONTARIO

This Competitive Automatic Air Valve

No. 4 Valve

is made of the best brass obtainable and equipped with high-grade carbon. Every valve is guaranteed by us, being tested before leaving our factory. Write for quotations. Prompt deliveries insured.

No. 209 W.W. Valve

This small, inexpensive wood wheel valve is a very ready seller. Thousands being sold every year. Give us a trial order. A fair sized stock carried by us at all times.

The BEATON & CADWELL MANUFACTURING Co.
New Britain, Conn., U.S.A.

Eastern Agent: J. R. Devereux & Co., 233 St. James Street, Montreal. Western Agent: A. E. Hinds & Co., Chamber of Commerce, Winnipeg.

B-O-T CLOSETS

Guaranteed Five Years.

Look for the Trade-Mark.

TRADE B.O.T. MARK

THE B-O-T MFG. CO., Ltd.
B-O-T Building
159-161 Richmond St. West, TORONTO

Montreal — Thos. Robertson & Co., Ltd.
Winnipeg — J. H. Leonard, 405 Tribune Bldg.
Edmonton — Carroll-Wilson Co.
Vancouver — Robertson-Godson Co.

Talking to the Point—

CLASSIFIED ADS. get right down to the point at issue. If you want something, say so in a few well-chosen words. Readers like that sort of straight-from-the-shoulder-talk, and that is the reason why condensed ads. are so productive of the best kind of results.

CLASSIFIED ADS. are always noticed. They are read by wide-awake, intelligent dealers, who are on the lookout for favorable opportunities to fill their requirements.

TRY A CONDENSED AD. IN THIS PAPER.

Classified Buyers Guide

Occasionally advertisements are inserted in the paper after this page has gone to press. The insertion of the Advertiser's name on this page is not part of the advertising order, but is inserted solely for the convenience of the reader of the paper

Air Line Systems.
C. A. Dunham Co., Ltd., Toronto.

Air Valves.
Canadian Wolverine Co., Ltd., Chatham.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
C. A. Dunham Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
Jenkins Bros., Ltd., Montreal.
Kerr Engine Co., Ltd., Walkerville.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Asbestos Goods.
James Morrison Brass Mfg. Co., Toronto.

Boilers, Steam or Hot Water.
Lord & Burnham Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Boiler Feed Regulators.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Brass Goods, Valves, etc.
Canadian Wolverine Co., Ltd., Chatham.
C. A. Dunham Co., Ltd., Toronto.
Galt Brass Co., Limited.
Jenkins Bros., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.
Speakman Supply & Pipe Co., Wilmington, Del.

Brass Pipe and Tube.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Speakman Supply & Pipe Co., Wilmington, Del.

Bubblers.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.

Cellar Drainers.
Galt Brass Co., Limited.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Chain Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Closets.
Amherst Foundry Co., Amherst, N.S.

Consulting Engineers.
Wayne-Roberts, Toronto.

Country Residence Equipments.

Damper Regulators.

Drainage Fittings.

Drinking Fountains.

Ejectors, Steam.
Kerr Engine Co., Walkerville.

Ejectors for Sewage.
National Equipment Co., Ltd., Toronto.

Engineers.
Galt Brass Mfg. Co., Galt.

H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.
Standard Ideal Mfg. Co., Ltd., Port Hope.

Electric Pumping Machinery.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Faucets.
Canada Metal Co., Ltd., Toronto.
Puro Sanitary Drinking Fountain Co., 143 University Ave., Toronto.

Fittings.
Canada Metal Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Flushometers.
Canada Metal Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.
Speakman Supply & Pipe Co., Wilmington, Del.

Floor and Ceiling Plates.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
Canada Metal Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Galt Brass Co., Limited.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
James Morrison Brass Mfg. Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Gasoline Engines.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Gas Water Heaters.
Galt Brass Co., Limited.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Generators.
W. E. Clark & Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.

Heaters.
Darling Bros., Ltd., Montreal.
Lord & Burnham Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Lead.
Canada Metal Co., Ltd., Toronto.
Galt Brass Co., Limited.
Hoyt Metal Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Mixing Valves.
Canada Metal Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Co., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Monkey Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Oil Storage Systems.
National Equipment Co., Ltd., Toronto.

Packing.
Canadian Wolverine Co., Ltd., Chatham.

Parkless Radiator Valves
W. E. Clark & Co., Toronto.
Kerr Engine Works, Walkerville.

Pipe and Radiator Hangers.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.

Pipe, Black and Galvanized.
Canadian Tube & Iron Co., Ltd., Montreal.
Lord & Burnham Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Warden King, Ltd., Montreal.

Pipe Cutters.
Trimont Mfg. Co., Roxbury, Mass.

Pipe Joint Compounds.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

Pipe, Soil, and Fittings.
Anthes Foundry Co., Toronto and Winnipeg.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Warden King, Ltd., Montreal.

Pipe Threading Tools and Machinery.
Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.
A. B. Jardine & Co., Hespeler.

Pipe Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Porcelain Ware.
Canada Metal Co., Ltd., Toronto.
Amherst Foundry Co., Amherst, N.S.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Pumps.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
Galt Brass Co., Limited.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Radiators.
Lord & Burnham Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., New Britain, Conn., U.S.A.

Radiator Traps (Steam).
Canada Metal Co., Ltd., Toronto.
W. E. Clark & Co., Ltd., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Reducing Pressure Valves.
Canada Metal Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Septic Tank Valves and Syphons.
Anthes Foundry Co., Ltd., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
West Toronto Foundry Co., West Toronto.

Solder.
Canada Metal Co., Ltd., Toronto.
Hoyt Metal Co., Toronto.

Steam Specialties.
W. E. Clark & Co., Ltd., Toronto.
Darling Bros., Ltd., Montreal.
Dart Union Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Wabash, Ind.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville, Ont.

Steam Traps.
Canadian Morehead Co., Ltd., Woodstock.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Geo. W. Cole Co., Toronto.

Smoke Test Machines.
James Morrison Brass Mfg. Co., Toronto.

Tanks, Steel and Wood
Ontario Wind Engine & Pump Co., Toronto.

Temperature Boosters
W. E. Clark & Co., Toronto.

Testing Plugs.
James Morrison Brass Mfg. Co., Toronto.

Tools.
Armstrong Mfg. Co., Bridgeport, Conn.
Canadian Wolverine Co., Ltd., Chatham.
Hall & Sons, Ltd., Brantford.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Nicholson File Co., Port Hope, Ont.
Williams, J. H., & Co., Brooklyn, N.Y.

Unions.
Canada Metal Co., Ltd., Toronto.
Dart Union Co., Ltd., Toronto.

Vapor Heating Systems.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
W. E. Clark & Co., Ltd., Toronto.

Vitro Tanks
Cluff Mfg. Co., Toronto.

Vacuum Systems of Heating.
W. E. Clark & Co., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Water Supply Systems.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Darling Bros., Ltd., Montreal.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Keep Up Your Reputation

The public are like sheep—they follow the leader. If you want to be the leading Heating Engineer, you should protect your reputation by handling such a reliable line as the King Boiler and King Radiators.

For all Heating Installations Specify . . . KING Hot Water Boiler and Radiators

The appearance of our lines is superior. Not only attractive in looks, but they give a constant service which reflects credit upon the Engineer who installs them.

STEEL AND RADIATION, LIMITED

Mfrs. Steel Sash, Concrete Reinforcing, Metal Lath, Steam and Hot Water Heating Systems.

Head Office, Fraser Avenue, TORONTO

ALPHABETICAL LIST OF ADVERTISERS

Occasionally advertisements are inserted in the paper after the index has been printed. The insertion of the Advertiser's name in this index is not part of the advertising order. The index is inserted solely for the convenience of the readers of the paper.

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Wallaceburg Brass & Iron Mfg. Co. 33

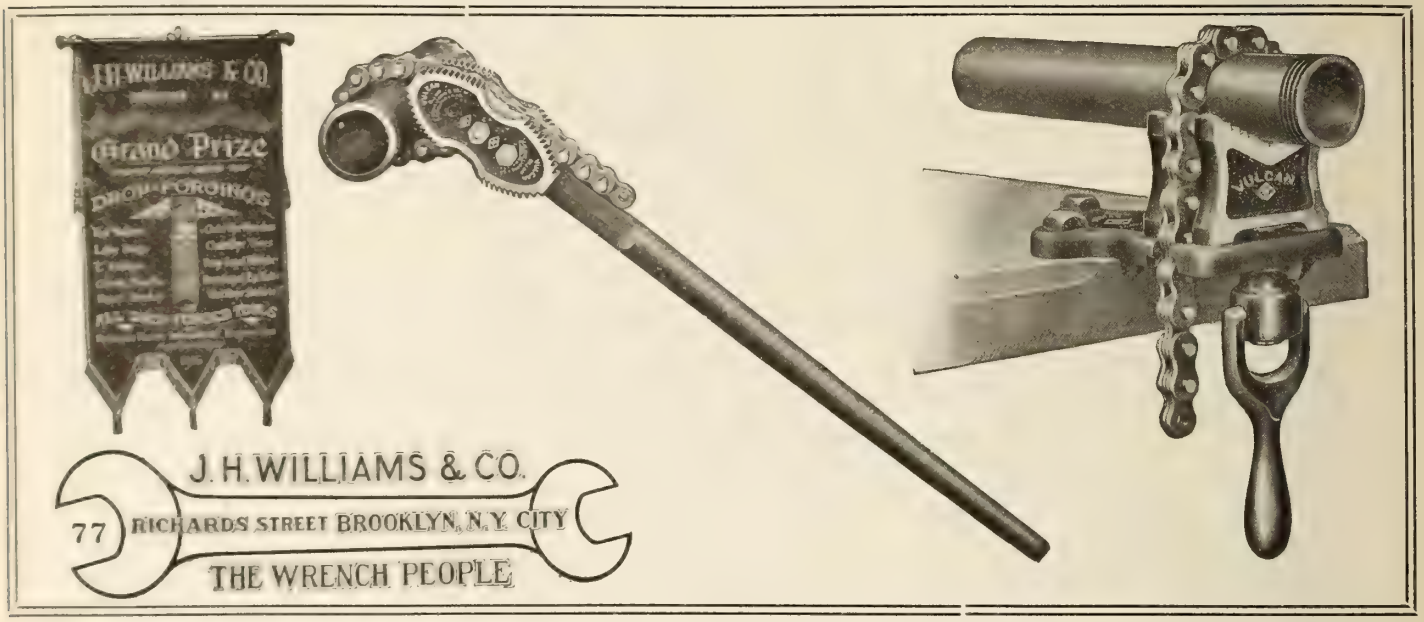
WROUGHT PIPE

BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED
Montreal Works: Lachine, Can.

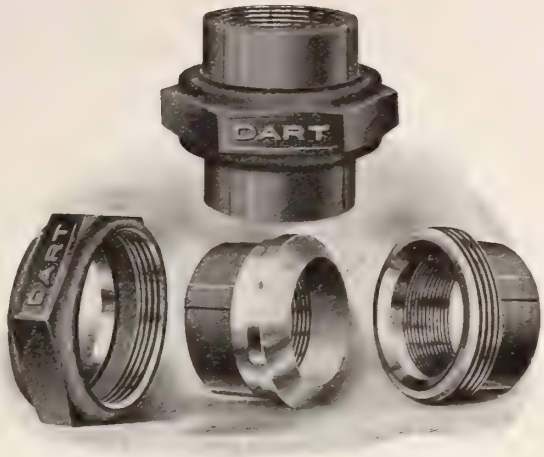


WHEN trade begins to boom it will be exceedingly difficult to jump in, overtake and pass the man who continued, even in times of depression, to paddle his advertising canoe.

It will require a high power campaign and lots of anxiety to do it. Even at that the persistent advertiser may beat the other fellow to it.

DART

—UNIONS—



Bronze to Bronze
at the joint
—No deterioration

Heavy Iron Parts
—No stretching or pulling apart

Easily Connected
—whether pipes are in or out of line

Satisfied customers are a sure result of using Dart Unions, because the Dart's Efficiency is practically everlasting.

Positively guaranteed.

SOLD BY ALL JOBBERS.

Manufactured by
DART UNION CO., Limited
Toronto, Canada

MADE IN CANADA

Kerr Radiator Valves and Union Elbows

for Steam and Hot Water Heating Systems, possess the proper staying qualities. They are not only up to the minute in appearance, but are there with the quality under the polish and nickel. If you have been in the Heating business any length of time, you should be familiar with Kerr valves.

WORKS AT WALKERVILLE, ONT.

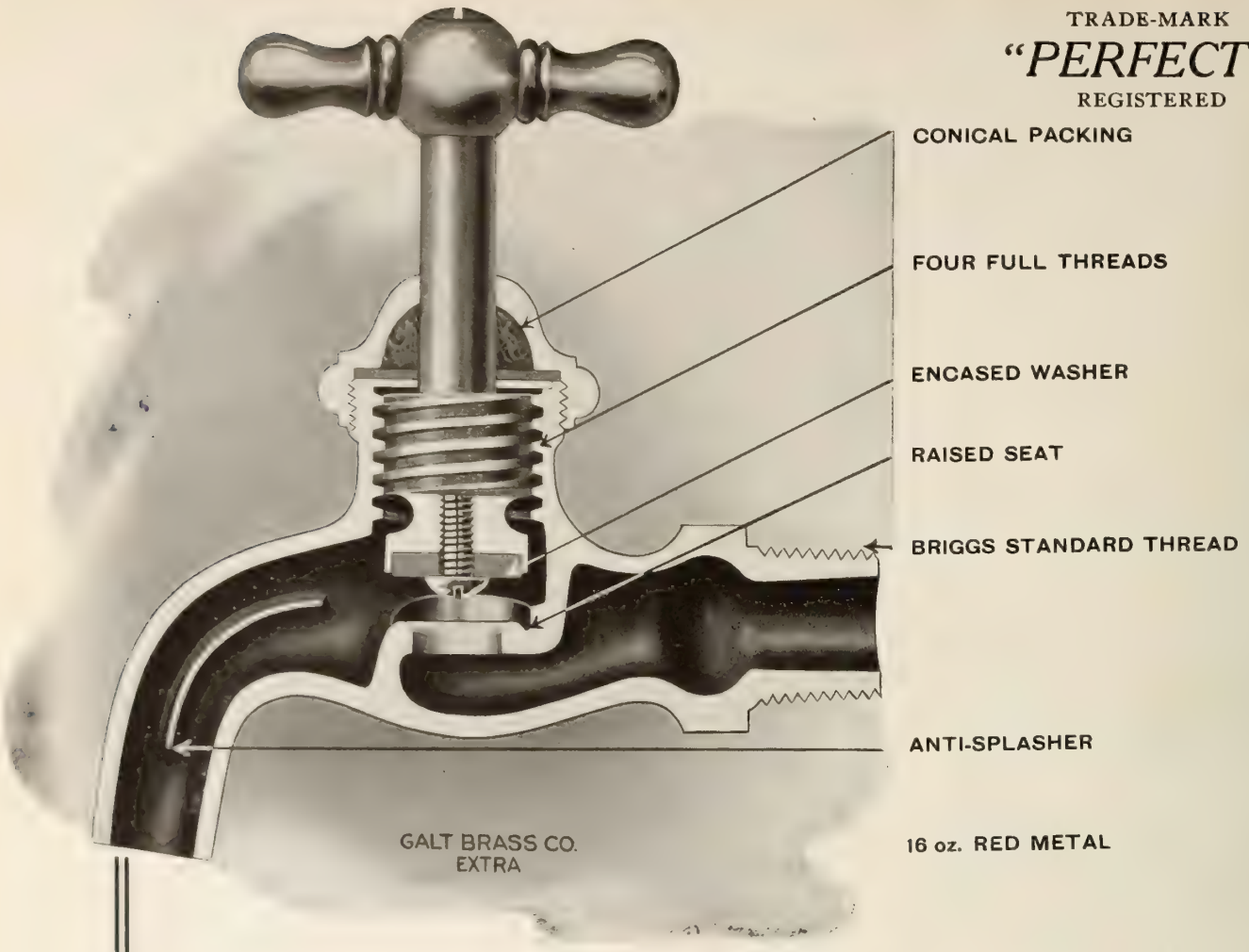
If you are new at the game, we invite you to "get wise" to this line of valves. Our catalogue No. 5, is yours for the asking.

You don't experiment when you buy Kerr valves.

We paid for the experiments long ago.

The Kerr Engine Company
LIMITED
WALKERVILLE, ONTARIO

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. X | Publication Office: TORONTO, SEPTEMBER 1, 1916 | No. 17

FILE COPY

PRESSURE SYSTEM

A. 1903

Empire Hydro-Pneumatic Water Supply Systems

We are creating business for you through our advertising in many Farm and Dairy Magazines. Are you getting your share of it?

The installation of one of our Hydro-Pneumatic Water Systems is of great importance to every owner of a farm or country home, and should be regarded not as a luxury, but as an absolute necessity. It is a profitable investment that pays large dividends right from the start, and adds greatly to the comfort of the home.

We can supply an outfit to suit all requirements.

When you install an Empire Water System you know it will do the work and you are sure of a satisfied customer.

Write us for our Catalogue describing Hydro-Pneumatic Water Systems.

We will have an exhibit at the Western Fair and will be glad to have you call and see us.

FILE COPY

EMPIRE MANUFACTURING CO., LTD.

LONDON TORONTO

The Goods You'll Eventually Buy

Based upon a quality, second to none; you make no mistake in starting now to supply your customers with BEAVER BRAND White Enamel Ware

Ask your jobber for BEAVER BRAND CAST IRON ENAMEL WARE
and build up your reputation

EVERY DOLLAR WE OWN STANDS BEHIND THE GOODS WE MAKE

Amherst Foundry Co., Limited

General Offices and Factory: Amherst, Nova Scotia

WRITE YOUR NEAREST AGENCY

AGENCIES:

ONTARIO:
Monarch Brass Mfg. Co., 71 Brown St., Toronto

MANITOBA and NORTHWEST:
E. B. Plewes, 120 Lombard St., Winnipeg

CANADIAN CONSOLIDATED RUBBER CO. LIMITED
DOMINION
RUBBER SYSTEM
AND ASSOCIATED COMPANIES

A SQUARE DEAL

The policy of the Dominion Rubber System is to provide every need in Rubber Goods, and to give a square deal to every buyer, no matter how small the purchase may be. That means—

A Square Deal in Values as Well as Qualities

Whether the purchase be a Rubber Nipple for the baby's bottle, a Rubber Shoe, a "Nobby" Tread Tire, a Dominion Raincoat or Garden Hose, we insist that the goods must be absolutely satisfactory.

No matter what the need in rubber may be, write to our nearest Branch or direct to the Head Office.

Canadian Consolidated Rubber Co.

Executive Office—Montreal, P. Q.

28 "Service" Branches Throughout Canada

We Test Our Boilers in Our Factory,

Instead of Your Doing It on the Job

TO our notion the one and only place to develop any possible defects in a Burnham Boiler is **right here** before it leaves our factory —not afterwards in your boiler buyer's cellar.

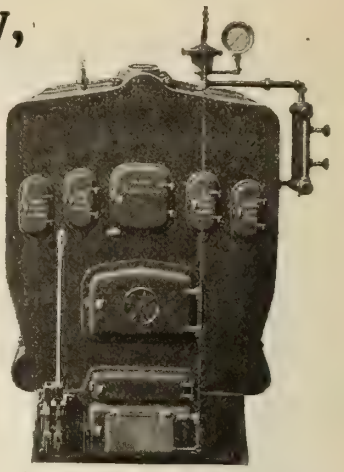
After each section is taken from the mould it is critically tested under a high-water pressure to detect any flaws or weak spots. All nipple openings are trued up to a thousandth of an inch. Each and every part must fit as snugly as a cork in a bottle.

In short—every boiler we make must notch right up to Burnham standard before it's allowed to go out to you or any other dealer.

So when you receive a Burnham Boiler you can set it up with the comfortable assurance that all the testing has been done ahead of time —by us.

Send for our handy vest pocket size Boiler Catalog.

We sell to the recognized jobber and the legitimate Plumbing and Heating Trade only. No goods sold retail.



Full-on View of the Burnham Square Sectional Steam Boiler

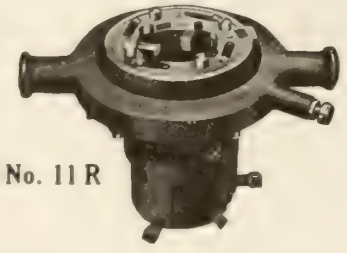
Lord & Burnham Co. Limited of Canada

Builders of Greenhouses and Conservatories

(Boiler Department)

Royal Bank Bldg., TORONTO **Factory: ST. CATHARINES, ONT.**

Burnham Cosy Comfort Heat BB



No. 11 R

"Jardine" Adjustable Ratchet-Threading Tool

Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely enclosed, excluding chips and dirt.

YOU CAN REDUCE THE LABOR OF PIPE THREADING 50 PER CENT., AND MAKE THREADS AS CLEAN AND PERFECT AS IF CUT ON A LATHE WITH ONLY ONE CUT WITH

"Jardine" and "Toledo" Pipe-Threading Tools

"Jardine" or "Toledo" dies spare the muscle of the man who does the work, and save money for the man who pays the wages, as they enable one man to do the work of two and costs less for repairs. No cams or jimcracks to wear and get out of order. Cutters that cut, don't squeeze. Set of cutters for each size of pipe. Lead screw ensures perfect pitch and form of threads. Adjustable to all variations of fittings, very durable cutters.

All threads finished at one cut. One man does the work of two.

It will pay you to look well into the merits of the Jardine" and "Toledo" before placing your next order for tools of this kind.

Write for catalog and full particulars.

We'll gladly supply the names if you wish to have a chat with users in your town.

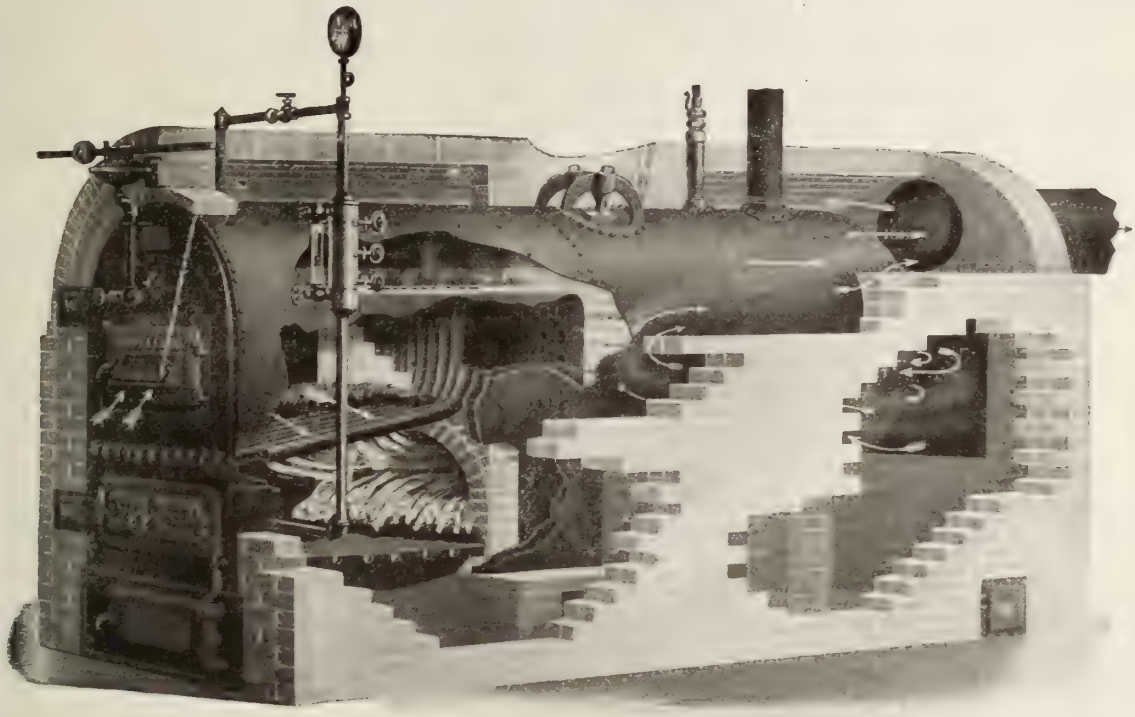
MADE IN CANADA

A. B. JARDINE & CO.

HESPELER, ONT.

Sole makers of "Jardine" Pipe-Threading Tools.
Sole licensees to manufacture and sell Toledo Pipe-Threading Tools in Canada.
Agents, Winnipeg and West—Stanley Brock, Ltd., Winnipeg, Man.
Brockville and East—J. R. Devereux, 233 St. James St., Montreal.

Smokeless and Straight Draft Firebox Boilers



Weil Smokeless Down Draft Boilers burn cheap grades of soft coal, economically and comply with the "No Smoke" by-laws.

Weil Firebox-Straight Draft Boilers burn any kind of fuel economically and with minimum attention.

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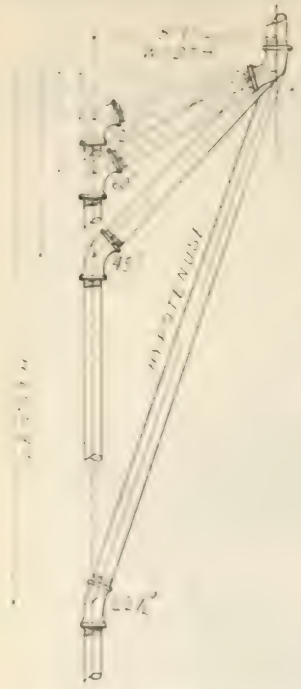

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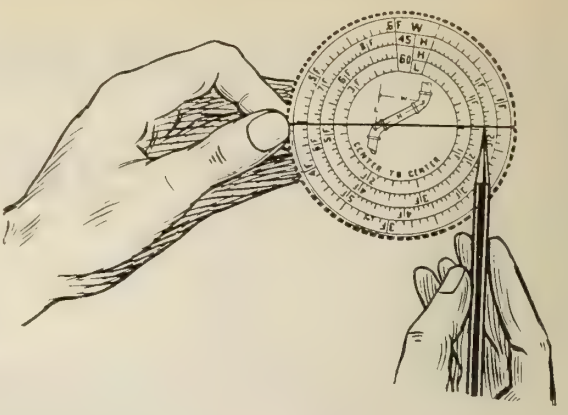

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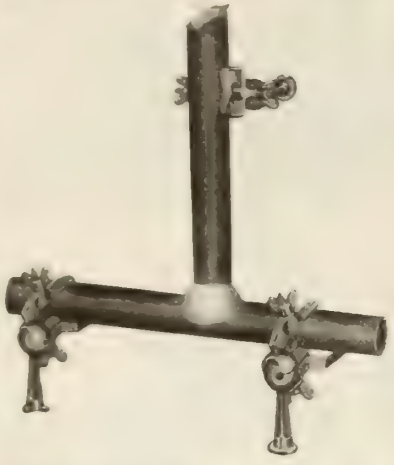

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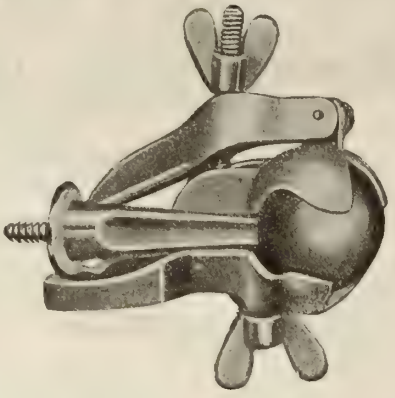

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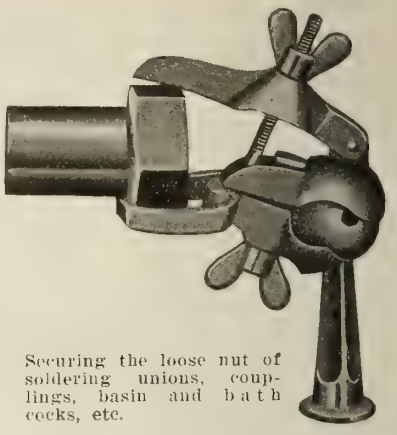

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This makes the basis for an extremely interesting article by H. F. Gadsby in the September issue of MacLean's Magazine. Mr. Gadsby discusses the Duff boom in a thoroughly impartial way, and tells something of the young Judge who may be slated for so high an honor.

"The Duff Boom" is but one of many features in the September MacLean's. The number bristles with bright stories and powerful articles by such clever and famous contributors as Arthur Stringer, Agnes C. Laut, Robert W. Service, Arthur E. McFarlane, Alan Sullivan, Mrs. Arthur Murphy (Janey Canuck) and many others. It is Canadian from cover to cover—the best reading obtainable on this side of the border.

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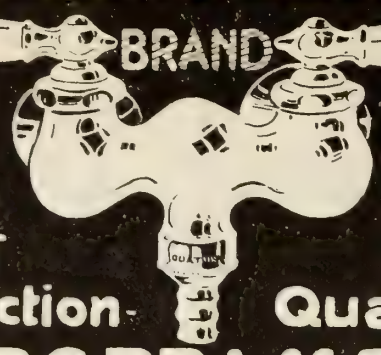

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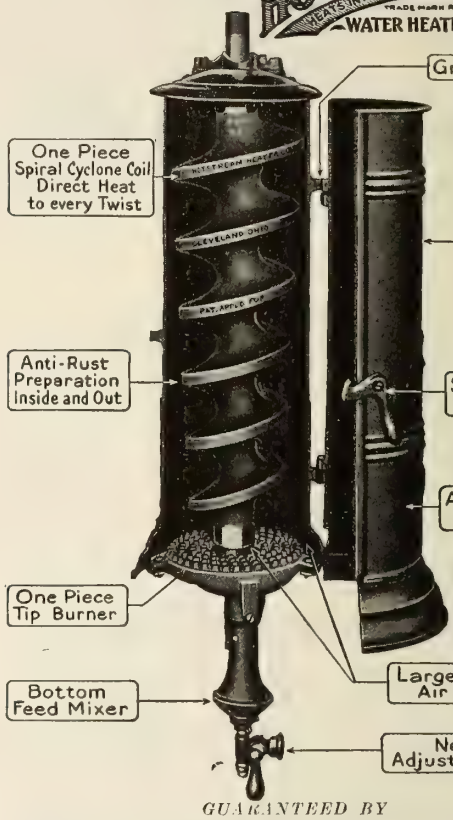
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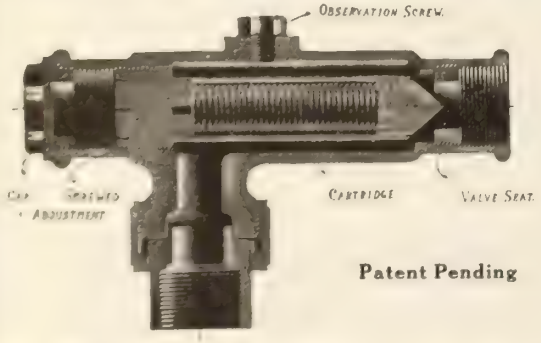

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SANITARY ENGINEER

PLUMBER AND STEAMFITTER OF CANADA

Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, SEPTEMBER 1, 1916 No. 17

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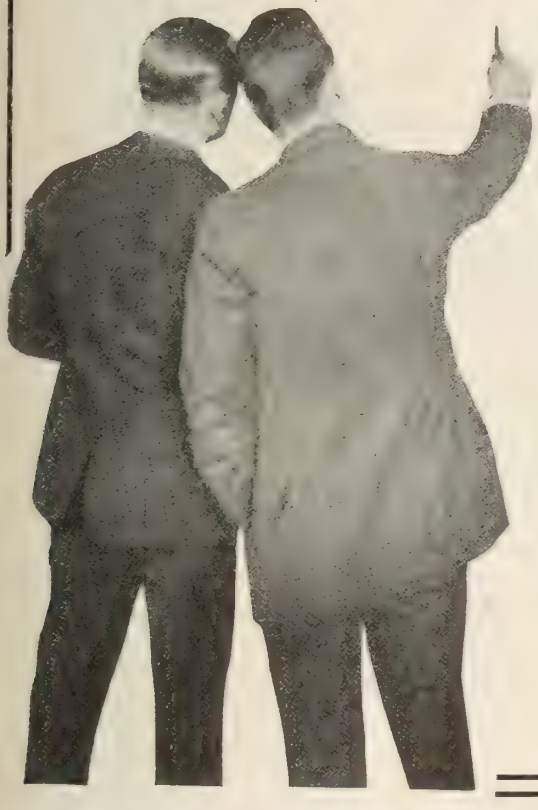

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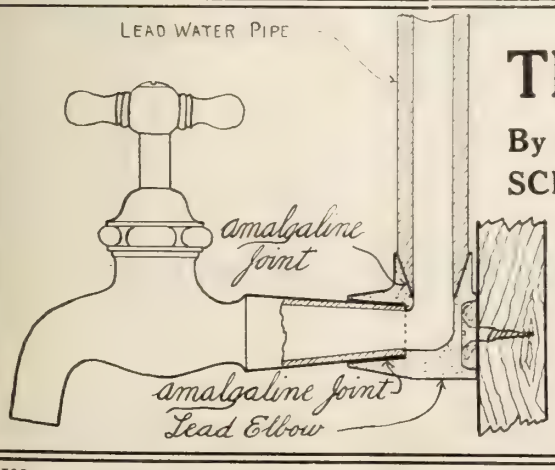

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The STANDARD IDEAL CO.
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The new company will continue to manufacture all high-grade enameled iron goods used by plumbers, and trust that their efforts will entitle them to the patronage and good-will enjoyed by the former company.

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THE SANITARY ENGINEER

VOL. X. SEPTEMBER 1, 1916 No. 17

A Discussion on Credits and Discounts

Who Do, and Who Do Not, Deserve Credit—What is Being Done on the Other Side of the Line—A Move to Eliminate Undesirables From the Business.

By One of Us.

THERE is a far cry in the air that something should be done to right wrongs, to uphold right and do all in our power to eliminate an evil which is sapping the vitals out of honest men, the evil of dishonest competition. What I mean by dishonest competition is this. A man starts in business and because he's a "good fellow" gets a certain amount of credit. That's all well and good so far. But his business increases, and his overhead expenditure piles up, he loses an account or two, or has not the time to devote to collections. Then nearly all plumbing jobs are done on credit, that is you cannot collect C.O.D. Your man can't very well collect an account when he leaves the job. Therefore there is a certain amount of money always on the books, and it begins to pile up to such an extent that in many cases a reduction is granted to "get some ready cash".

Now, how can these wrongs be righted? Simply by having a firm hold on the source of supply. In this connection some firms in the U.S. are using two schemes which are classed as "best" because they are "doing the trick". The first is described as follows and shows what is being done in Milwaukee, Wis.

The Arrangement

The following arrangement is in vogue in Milwaukee, Wis., and covers both heating and plumbing materials.

On Jan. 1st 1896 this scheme was put into effect in Milwaukee and has been of great benefit to both the jobber and the contracting plumber. Before this scheme was inaugurated, the jobbers had so much money tied up in accounts with the plumbers, that they might well consider the money so tied up as being invested in the contracting business.

Large sums of money so tied up were naturally not to the liking of the jobber, and were a serious detriment to the responsible contracting plumber, who either discounted his bills or paid same promptly at maturity. It is apparent that the jobber who has accounts tied up indefinitely with the irresponsible plumber, is really nothing more or less than a competitor with his most desirable customer—the plumber who pays promptly.

Another advantage of this system is that the fitter can take on only such work as his capital will permit, and the careless plumber is forced to pay close attention to his credits and collections and thus become a more thorough business man.

Goods sold to the trade in Milwaukee are subject to a discount of 10 per cent., meaning that a bill of goods that would ordinarily be invoiced at $90.00, would be invoiced at $100.00, and if settlement was made on or before the 10th of the month following purchase, a cash discount of 10 per cent. would be allowed.

The above is an outline of the scheme as started. However, about three years ago, it was modified partially at the request of the plumbers.

The objections of the trads were that they did not enjoy a real cash discount, such as was common, viz. 2 per cent. Then also we would, at times find a good responsible plumber that might find himself so tied up on the 10th of the month, that he could not avail himself of the cash discount, although he was absolutely good and responsible. These difficulties resulted in changing our plan as follows:—

The present plan of operation is that we give a discount of 10 per cent. and 2 per cent. on the 10th of the month following purchase, and if the plumber cannot avail himself of the discount, he has the privilege of the 10 per cent. if he pays the account on the 25th of the month, or before, thus giving him 15 days extra time to get his 10 per cent., but he, of course, loses his two per cent.

This modified system is considered more satisfactory, except possibly it might be considered advisable to cut the 15 days extra time to 10 days, making it the 20th of the month. But very few 10 per cent's. are ever collected, and the trade that cannot avail itself of this discount is undesirable and does not last long.

To sum up the whole proposition, it was not organized to collect fines, that is the 10 per cent. more than we would receive for the goods ordinarily, but to reduce losses and prevent the tying up of capital in the contracting business, and assisting unfair competition.

It might be of interest to state that when the system was inaugurated, it was impossible for all the trade to clean up their accounts so that in many cases notes were taken and these were gradually reduced. In one case an account that has amounted to $6,000,.00 and had never been balanced, notes were taken and these were gradually reduced and it took over six years to clean it up. This was jobbers' money invested in the plumber's business although it was not intended for that at the first.

Another, and perhaps the most important point of the scheme, is the elimination of losses. One firm doing a large jobbing business, one of the largest in the city, states that their losses are only a small fraction of what they were before, and for a period of from 1900 to 1915—15 years—amounted to only $3784.00 or $252.00 per year on an average, a most satisfactory average.

As Matters Stand in Chicago

The following arrangement in the matter of Cash Discount and handling of accounts applies to Chicago, and Cook County in which Chicago is located.

1. (Q) Does your cash discount scheme apply to both plumbing and heating goods?

(A) Plumbing goods only, heating goods take the usual 2 per cent. 10 days, or 30 days net.

2. (Q) Are there certain goods exempt from this plumbing discount?

(A) Pipe and fittings are classified with heating.

3. (Q) Are the jobbers and manufacturers in accord with this locally?

(A) All but two of the jobbers are in the deal. The manufacturers are not in because none of the manufacturers here who sell the jobber, sell to the trade.

4. (Q) Do they like the system, and do they propose continuing it?

(A) Yes. Has been in force two years.

5. (Q) What is the cash discount and when should the accounts be paid to get the discount .

(A) 5 per cent. to be paid on the 10th of the month following purchase.

6 (Q) If the cash discount is not taken, when is the account due net

(A) On the 15th of the month, or 5 days after the discount date.

7. (Q) If not paid then, how long before the name is posted?

(A) 60 days. Customer is then considered in arrears and placed on the cash list. No one will sell him except for cash until the account is paid.

8. (Q) If settlement is made without discount, would you accept a note, i. e. after the discount date has elapsed?

(A) No, excepting in extreme cases and then it is voted on by all. Extreme cases would be when customer has good record and some unusual circumstances has placed him in arrears. Time of note is agreed upon to suit each case.

9. (Q) If the note is not paid at maturity, is a removal allowed to save the customer from being posted?

(A) This is handled same as No. 8.

10. (Q) What is your cash discount?

(A) 5 per cent. rate was never changed.

11. (Q) How do the trade like the system?

(A) The only ones objecting are those who are no good and are always in the back seat. The good trade like it, and it keeps out most of the undesirables. Most of the smaller trade say they are in better shape than before as they have to collect their bills to buy their goods and it has made them better business men. When this system was started, the sellers took 4 months notes from all owing money, and started accounts with a clean sheet.

N. B. The above system is working satisfactorily in Cleveland and other cities.

There is no doubt some such system as these above described is eminently desirable in Canada. The subject is one well worthy of discussion and the opinions of readers of Sanitary Engineer in this regard could not fail to be interesting.

ONE OF THESE DAYS

THE above is the title of an article which appeared in the Toronto Star, Aug. 14, which should appeal to live progressive sanitary engineers and which reads as follows:

"St. Louis is trying out vacuum cleaners in taking up dust from the main streets of the city. The test will be made for two months. The plan may not work, but if not it will merely be owing to the system not being perfect as yet. The experiment will hasten the day when the perfected machine will do the work efficiently.

"It seems certain that sooner or later, and perhaps right away, human ingenuity will prove equal to the task of gathering the dust and disposing of it instead of going on as has been done for thousands of years in sweeping it in one direction, then in another, of wetting it and letting it dry—of sweeping it out of shops into the streets only to let it blow into the shops again. There must and will be a machine that will arrest the dust and dirt, pick them up and carry them off to a public fire where they will be destroyed.

"And when these machines do their work thoroughly public health will show statistics that will be good reading."

It appears that the City of St. Louis is endeavoring to have a dustless or at least a cleaner city. Those who have had a mechanical training know full well that the experiment need not be a failure.

The Star like most papers is contented to refer to such matters in a few lines but will not be drawn into any discussion or even publish articles which are of real human value. The City of Toronto allows the main house trap and breather and the old tile drain under buildings to hold sway, which means that the sewers are not ventilated, that leaking tile pipe joints are polluting the ground around our homes and buildings, and that the dust in the street as well as the atmosphere of our cities is being continually vitiated.

Further, when the sanitary and heating engineers try to improve conditions the daily press as a rule cry " combine," " graft", etc.. What every city wants and is longing for is the independence and solidity of the press. The people require to be educated to a point higher than mere price; they want to be shown how to prevent tuberculosis.

No one wants cures as urgently as prevention of the ills which require the cure. If sanitary engineers had been given full sway, New York would not now be struggling against the scourge of infantile paralysis.

If London had heeded the plumbers in days of old, she would not have been nearly wiped out with plague.

And Toronto is very little removed from conditions which started the plague in London. That dump on Morley Avenue is a disgrace to humanity. There are men in Toronto who could cure the evil at a very moderate cost. But the press is stifled, and men who "know how" are also stifled. Men have applied to powers that be to inspect Morley Ave. dump and have either been put off or refused admission. Why? Because if these matters were looked into some of those higher up would get pulled down. What we want is more cleanliness, more dustless homes; more prevention and less cure. We want the support of a free press, which we cannot expect when it is owned by monopolists and politicians.

Sanitary and heating engineers in Canada could if given half a chance clean up filthy conditions. They can keep our atmosphere purer, our water free from pollution, our homes dustless and our houses better heated and ventilated, but price is the dominant factor and life and health are secondary considerations, due chiefly to lack of education. There is nothing very wonderful in cleaning streets by vacuum if the system is made permanent and is not a temporary matter, any more than cleaning a house of dust by a stationary, rather than by a temporary vacuum cleaner, and the very dust in our streets need not be as injurious if our sewers are ventilated and not allowed to emit foul gases which settle and are absorbed by the dust.

If every home had to be equipped with a stationary vacuum cleaner just as with a stationary W.C. There would be a marked improvement in our health statistics. It is nothing short of alarming to view the black dotted chart which is on view in the office of the Toronto Health Department and particularly so when 90 per cent. of the ills described are preventable, and are caused by lack of cleanliness.

The Canadian National Exhibition grand stand has a seating capacity of 16,800, with room for 8,000 more on the lawn.

AN EXTERIOR IMPRESSION OF MONTREAL'S TECHNICAL SCHOOL.

Montreal Technical School and Its Equipment

In the Brief Space of Some Five Years Since its Establishment, the Montreal Technical School Has Amply Demonstrated its Worth as a Developer of our National, Commercial and Industrial Enterprise—a Recital of the Contributory Factors

IN the early days of modern engineering the opportunities of acquiring a knowledge of the principles of various branches, either from a practical or theoretical standpoint, were very limited, in comparison with those of the present time. The remark is often heard that "there are fewer possibilities for advancement now than years ago." This in many respects is a mistake, for while the achievements of the scientific world in the past quarter of a century have been exceedingly remarkable, the probabilities are that the next twenty-five years will surpass all previous records; and it is the boys and young men of today that we must look to for the accomplishment of these future developments, in all branches of science and engineering research.

Before the advent of systematic training, the average boy was generally taken into a workshop without any previous knowledge of the duties he would have to perform; and his success, or failure, resulted largely in his ability to adapt himself to his new environment, aided possibly by the advice and instruction of one or two of his shop mates and occasionally the foreman.

The ideal system of training for engineering trades is by means of technical schools. Through these institutions, all classes of boys are given adequate and complete instruction in the various trades, both from a theoretical and practical standpoint, and the Montreal Technical School described in this article is a recent example of the perfection to which educational institutions of this nature have been developed.

FIG. 1. SHOWING PUMPING AND BOILER INSTALLATION.

Main Building

This large commodious building, built and equipped at an approximate cost of $825,000, and annually subsidized by the Provincial Government of Quebec, with an additional yearly grant from the City of Montreal, was officially opened in 1911. The building is composed of two distinct sections, the main structure, which con-

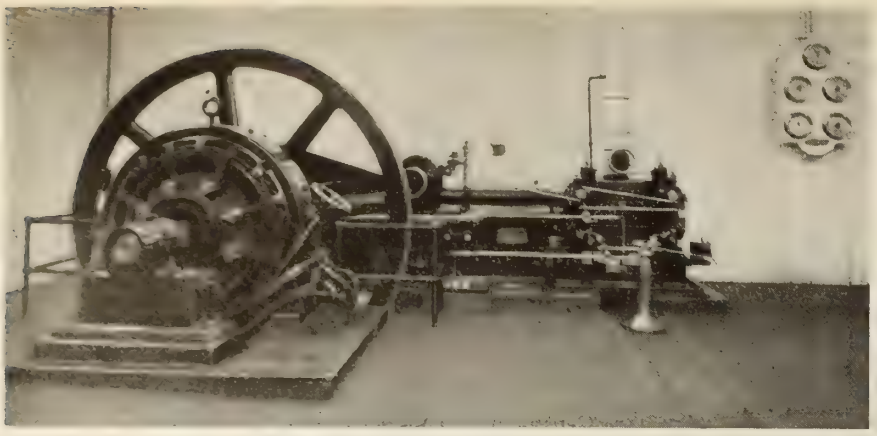


FIG. 2. CORLISS ENGINE AND GENERATOR OF 150 H.P. AND 125 K.W. RESPECTIVELY.

tains the administration offices, being located on Sherbrooke Street. In addition, there are several suites of class rooms for theoretical teaching, the various laboratories, two small amphitheatres to seat 100 each, one large amphitheatre with a seating capacity of 600, and a large hall.

In addition to requirements for instruction, the comfort of students is well provided for:—spacious and convenient waiting rooms, toilets, shower baths, and suitable furniture being installed; in fact, nothing has been spared to provide modern and efficient surroundings conducive to the success of the school as an educational institution, while from the viewpoint of comfort and hygiene, conditions approach the ideal.

Boiler Room

To the rear of the main structure are the power house and various work shops, all constructed along the lines of modern industrial practice. The power house, which is in the middle of the group consists of a boiler room, an engine room and a gas producer plant. The boiler room equipment shown in Fig. 1, consists of two Babcock & Wilcox 200 horsepower, water tube boilers, equipped with chain grates, operated by a Miller Bros. and Jones vertical engine; one Delaunay Belleville (French) marine type 100 h.p., hand fired boiler, with automatic regulated water feed. Two plunger type, Fairbanks-Morse pumps are used for the feed water, these are shown in the left foreground of Fig. 1. To the rear of the feed water pumps are two Kerr steam turbines, direct connected to two 24-inch centrifugal pumps. for supplying water to the forced hot water heating system, throughout the buildings. Two large Cochrane heaters are also installed, so arranged that one is supplied with exhaust steam from the

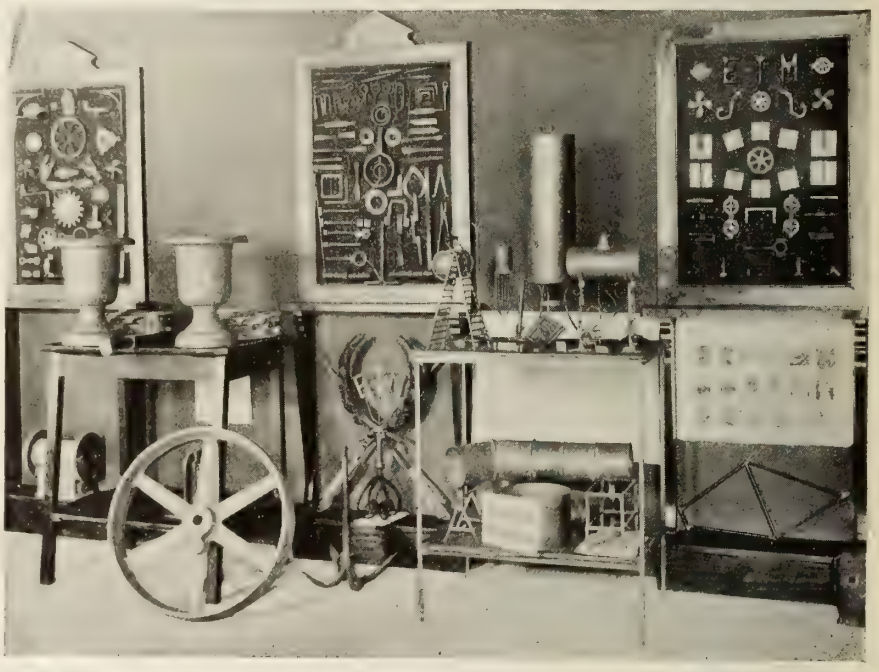


FIG. 4. PRODUCTS OF THE SCHOOL FOUNDRY, FORGE, AUTOGENOUS WELDING AND MACHINE SHOPS, ETC.

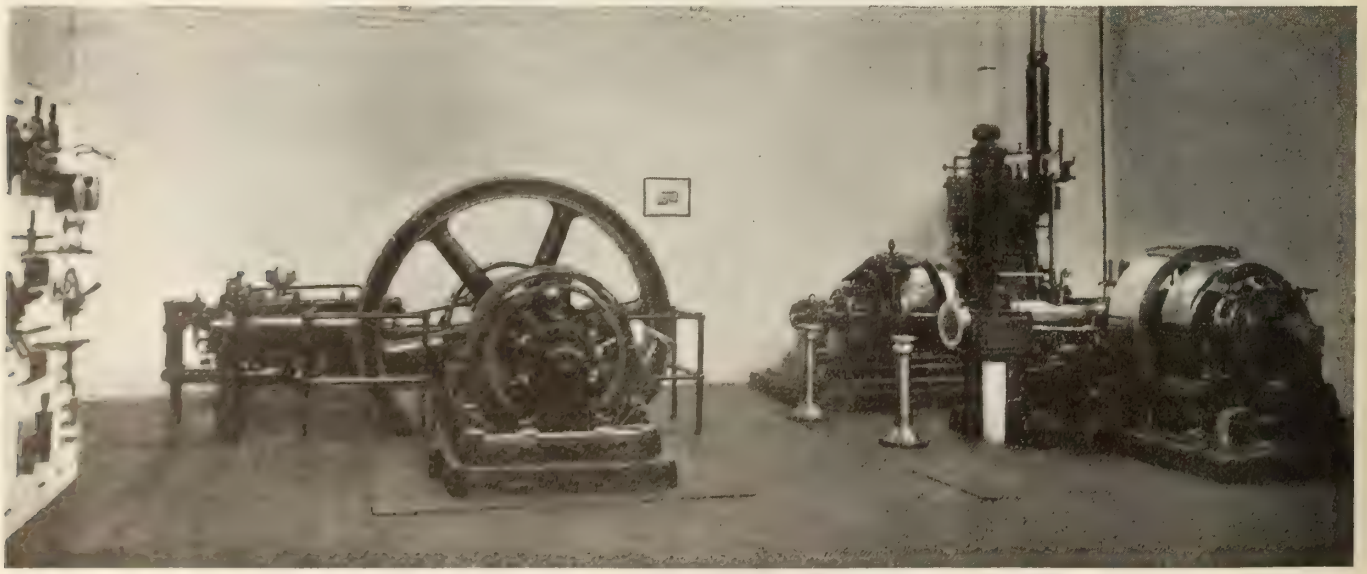


FIG. 3. SHOWING 35 H.P. HORIZONTAL GAS ENGINE, 35 H.P. HORIZONTAL STEAM ENGINE, AND COMPOUND VERTICAL STEAM ENGINE, DIRECT CONNECTED IN EACH CASE TO GENERATORS.

engines and the other with live steam from the boilers. In the event of insufficient exhaust steam being available to heat the water to the desired temperature, an automatic system of control operates a valve and allows the water to pass through the live steam heater before passing to the heating apparatus throughout the building.

Heating and Ventilating System

An interesting feature of this installation is the utilization of every pound of exhaust steam for heating purposes before the addition of live steam becomes necessary and the consequent absence of back pressure on the engines. This system is so satisfactory that the return water after heating is only a few degrees below that of the outgoing or heated water. The large ventilating fans and steam coils are regulated by the Powers system of automatic temperature control.

FIG. 6. THE FORGE AND BLACKSMITH SHOP.

FIG. 5. CARPENTER, JOINER AND PATTERN SHOP.

An allowance of 30 cubic feet of fresh air per minute is provided for each pupil with a liberal additional amount of ventilation in all class rooms and workshops.

A complete vacuum cleaning system is installed, with connections at convenient location throughout the entire building.

Engine Room

In keeping with the general policy of instruction and at the same time to provide the necessary power equipment for the building the engine room units are of various, but modern types. The largest unit is that shown in Fig. 2, which is a 150 horse-power Goldie & McCulloch Corliss engine, direct connected to a 125 k.w. Allis-Chalmers-Bullock generator. The other three units are shown in Fig. 3. In the right background is shown the 100 horse-power vertical compound, Belliss and Morcom engine, equipped with forced lubrication system, and direct connected to 75 k.w. Westinghouse generator. Directly in front of this is seen the Robb-Armstrong 35 horse-power horizontal engine, direct connected to a 35 k.w. Canadian Crocker-Wheeler generator. To the left is shown a Duplex (French) 35 horse-power gas engine direct connected to a 25 k.w. Canadian General Electric generator. This unit is operated with producer gas, obtained from a small plant in the adjoining room. This consists of a Pierson (French), gas producer, with scrubbing and cooling equipment which delivers clean gas at a suitable temperature for use in the engine. A suction fan operated by a Robbins & Myers motor is used to start the gas producer. To operate the Duplex engine it is necessary to start with compressed air, which is supplied to a reservoir at a pressure of 175 lbs. per sq. inch. After the first stroke the gas is drawn into the engine and automatically regulated acording to the load.

In addition to the gas producer this room contains an Ingersoll-Rand air compressor for supplying high pressure air for pneumatic tools, etc.

(Continued in next issue)

FIG. 7. THE GREY IRON FOUNDRY.

Forcing a Hot Water Heating System

Applying the Principles of Hydraulics to an Ordinary Gravity Hot Water Heating System—Some Interesting Experiments Made Which Proved Successful.

By "Consulting Engineer."

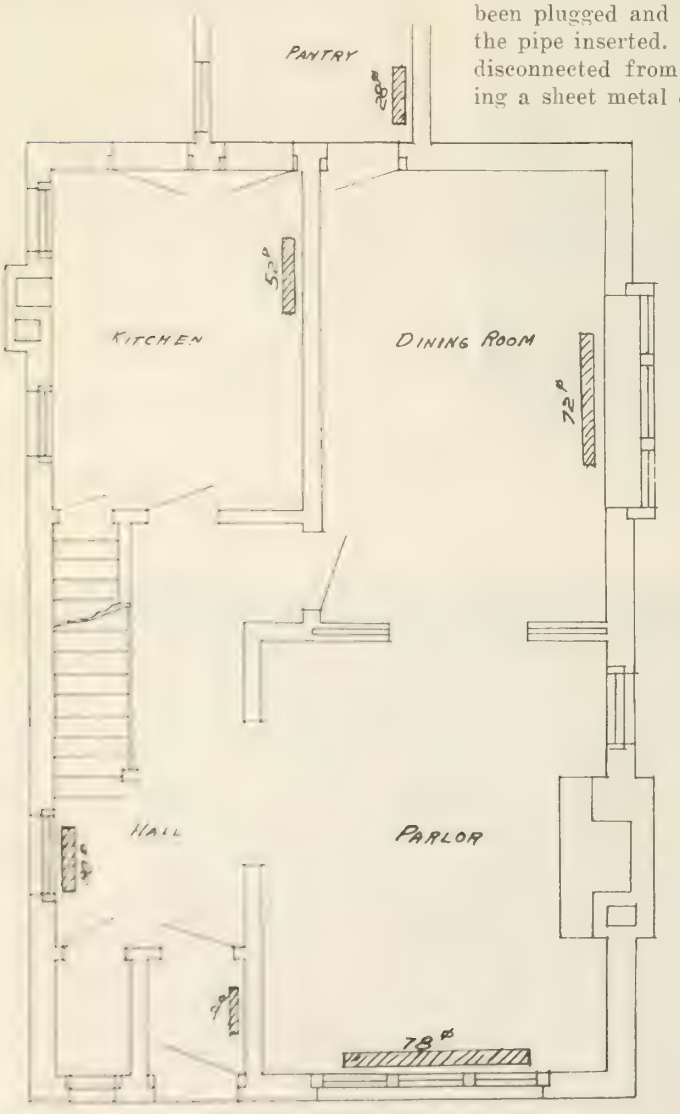
THE following description of methods and results of forcing the circulation of a gravity hot water heating job will no doubt be interesting to many readers of The Sanitary Engineer.

Figs. 1 and 2 are floor plans of a eight room brick house showing location of radiators etc., Fig. 3 shows location of boiler and arrangement of piping in the basement of the building. It will be noted that the whole arrangement is a standard gravity hot water layout for a house of this size. The system had been in use for several seasons and no unusual trouble had been experienced from slow circulation. Like all gravity jobs, the radiators required some time to show the effect of an accelerated fire in the basement. For this reason it was decided as an experiment to try the effect of forcing the circulation by mechanical means.

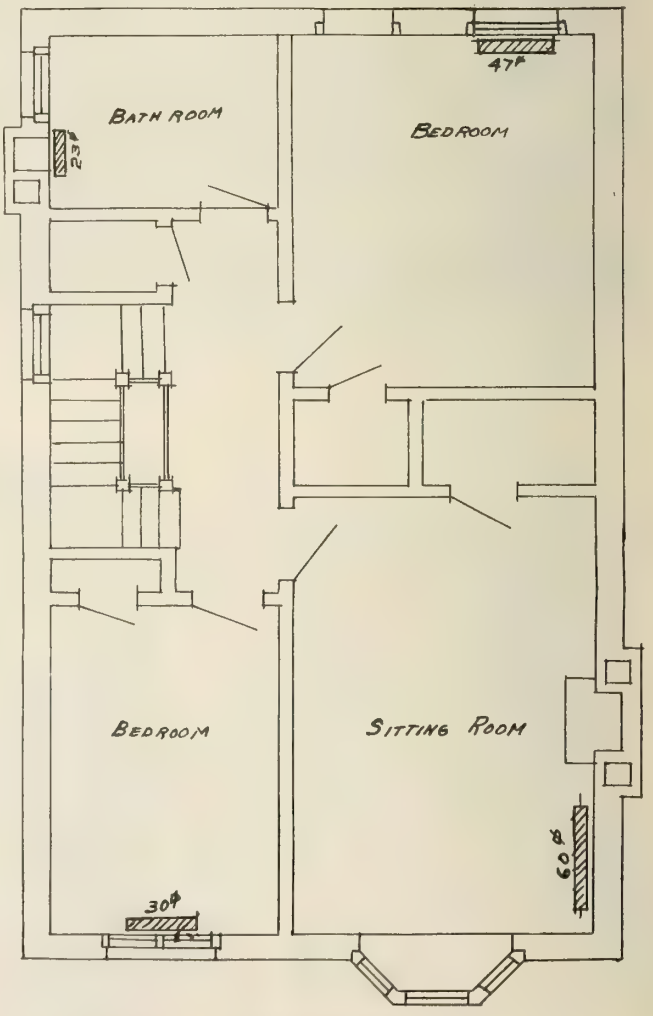
A special type of electrically driven pump was connected to the system as shown in Figs. 4 and 5. These views show only the relation of the boiler, the pump and the supply or flow headers. The boiler had three 3-inch tappings in the top, of which two were connected to flow headers. The pump inlet was connected into the third opening and the outlet of the pump was connected into one of the flow headers. The end had been plugged and this was removed and the pipe inserted. This flow header was disconnected from the boiler by inserting a sheet metal disc at A, which completely blocked up the opening. The motor which consumed about the same power as a 100 watt lamp was connected to the electric light circuit and operated by a knife switch.

The pump was installed early in January last and was in use for the rest of the winter season and it was found to have many decided advantages while the cost of operation was not noticeable on the monthly electric light bills. The motor was not used on the average more than one hour per day and figuring electric current at three cents per kilowatt hour and the heating season as 200 days, we get a total current consumption of 20 kilowatts so the yearly cost would be about sixty cents.

The construction of the pump was such that when it was not in use, there was ample area for free circulation by



GROUND FLOOR PLAN
FIG 1



FIRST FLOOR PLAN
FIG. 2

gravity. It was not necessary to operate any valves at all. When the pump was not in use the water flowed through it just as it would through any pipe or fitting and to start the pump it was only necessary to turn on the current. It will be noted by referring again to Figs. 4 and 5 that the pump was connected to only one side of the system. This was done in order to find out just what resistance the pump offered to the free circulation of the system by gravity. It was found that this resistance was very small, much smaller than had been anticipated and the radiators at the rear of the house were practically the same temperature as those at the front of the house when the system was circulating by gravity. The water going to the rear radiators had to flow through the pump while the water going to the front radiators were connected in the ordinary way.

Following are some of the temperatures taken at different parts of the system.

In all cases temperatures were water temperatures taken by drawing off water from the flow and return headers by pet cocks and from the radiators by the air valves.

With radiator temperature of 113° F., supply header temperature of 145° F. and return header temperature of 123° F., the pump was started and in ten minutes all three temperatures were 134° F. On another day with supply header temperature of 172° F.; return header temperature of 146° F. and radiator temperature of 132°., the pump was started and in 10 minutes the temperature of all three was close to 152° F.

These are only two out of a number of measurements which were taken. All results tended to show that in from ten to twenty minutes after starting the pump, the temperature of radiator, flow header and return header were the same, the temperature of the supply header having been lowered and the temperature at the radiators raised

By thus bringing the cold water from the radiators to the hot boiler, the efficiency of the system was considerably increased and the temperature of the radiators being raised, these naturally gave off more heat. The pump was found to be very useful when forcing the fire. In starting the fire with cold water in the boiler, on a moderate winter day, it was found that the radiators were very hot inside of half an hour. The chief advantage however was in better control, that is, the temperature of the radiators could be raised much more quickly than otherwise and in the mornings when the temperature of the radiators was low, the pump raised their temperature in a few minutes to the extent of 15° F. to 20° F. without touching the fire, while if the drafts at the fire were opened. and a brisk fire started, the temperature of the radiators increased very rapidly.

This is due to the fact that with the ordinary gravity system the difference in temperature must be 30° to 40° in order to make circulation, while with mechanical circulation, this difference is reduced to 10° or less. In addition, the increase in the speed of circulation means that heat is given off faster and therefore the heat from the boiler is more quickly transferred into the various rooms, under conditions of gravity circulation, when a brisk fire was started in the boiler, it required an hour and a half before the effects were noticeable at the radiators, while by running the pump for a half hour or so, the temperature of the radiators rose almost as fast as the fire.

The advantages of having a pump to force such a system are so great that it will no doubt prove an attractive proposition to the house owner who does not want to wait for several hours in the mornings and evenings before the effect of the additional fire is felt in the rooms. This is especially true in the fall and spring where the sluggish circulation of gravity hot water is so much in evidence. The cost of operation is practically nil and the only expense is the original cost.

Forced hot water systems are of course in use in many large buildings and could of course be used in houses and there is no doubt that in case of a large house, the cost of the pump would be more than offset by the saving in the size of radiators and piping. In this case the pump would need to be run a much larger proportion of the time than in the system here described.

In case of poor circulation in a gravity system, there is no doubt that if some type of pump were used to force the circulation. A great improvement would be effected.

In the system here described, the head produced by the pump was 5¼ inches of water which is probably three or four times the head due to a difference in temperature of 30° to 40°. A higher head pump could of course be made and it would be much simpler to break the main supply pipe in the basement and insert such a pump than to tear up walls and floors to get a new line in. A similar use would be where additional radiators are being installed on an old system or where it is required to heat radiators below the level of the boiler, such as basement rooms which are at present heated by ceiling coils which are neither useful nor ornamental. These coils could be placed on the floor where they would be useful and also out of the way, of course the adoption of a pump to increase circulation is not by any means the only method. There are quite a number of heat generators of various types that are giving good results, but there are conditions which

(Continued on page 34.)

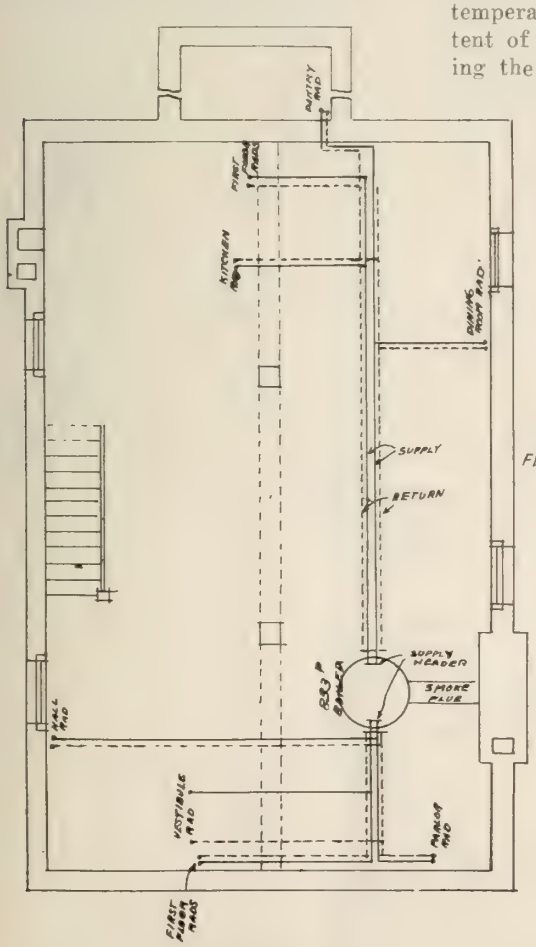
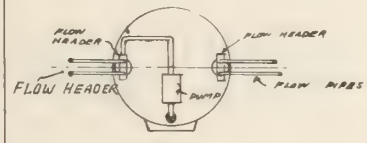
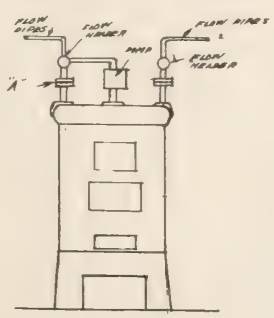


FIG 3



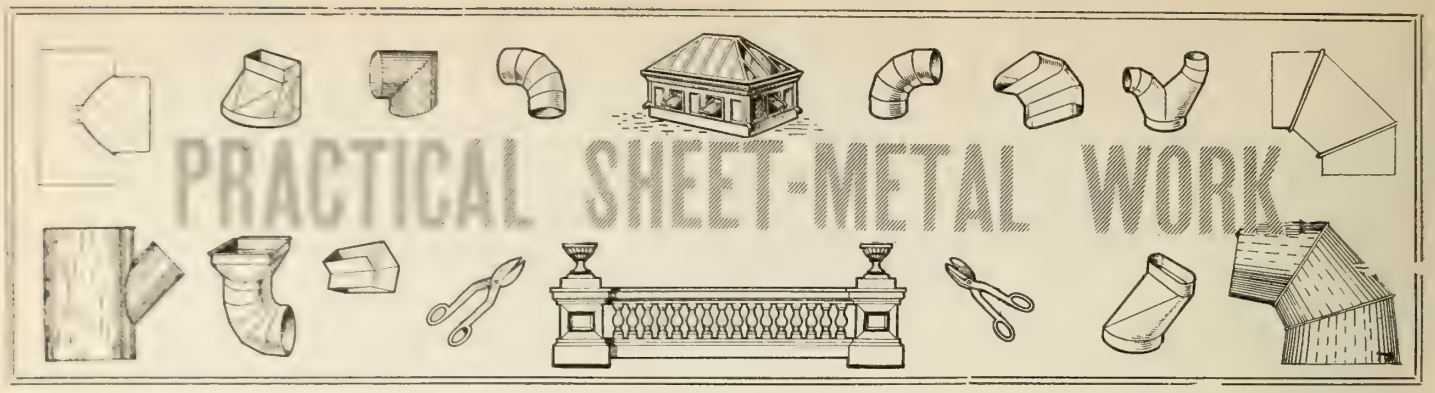
PLAN OF BOILER

FIG 5



ELEVATION OF FURNACE

FIG 4

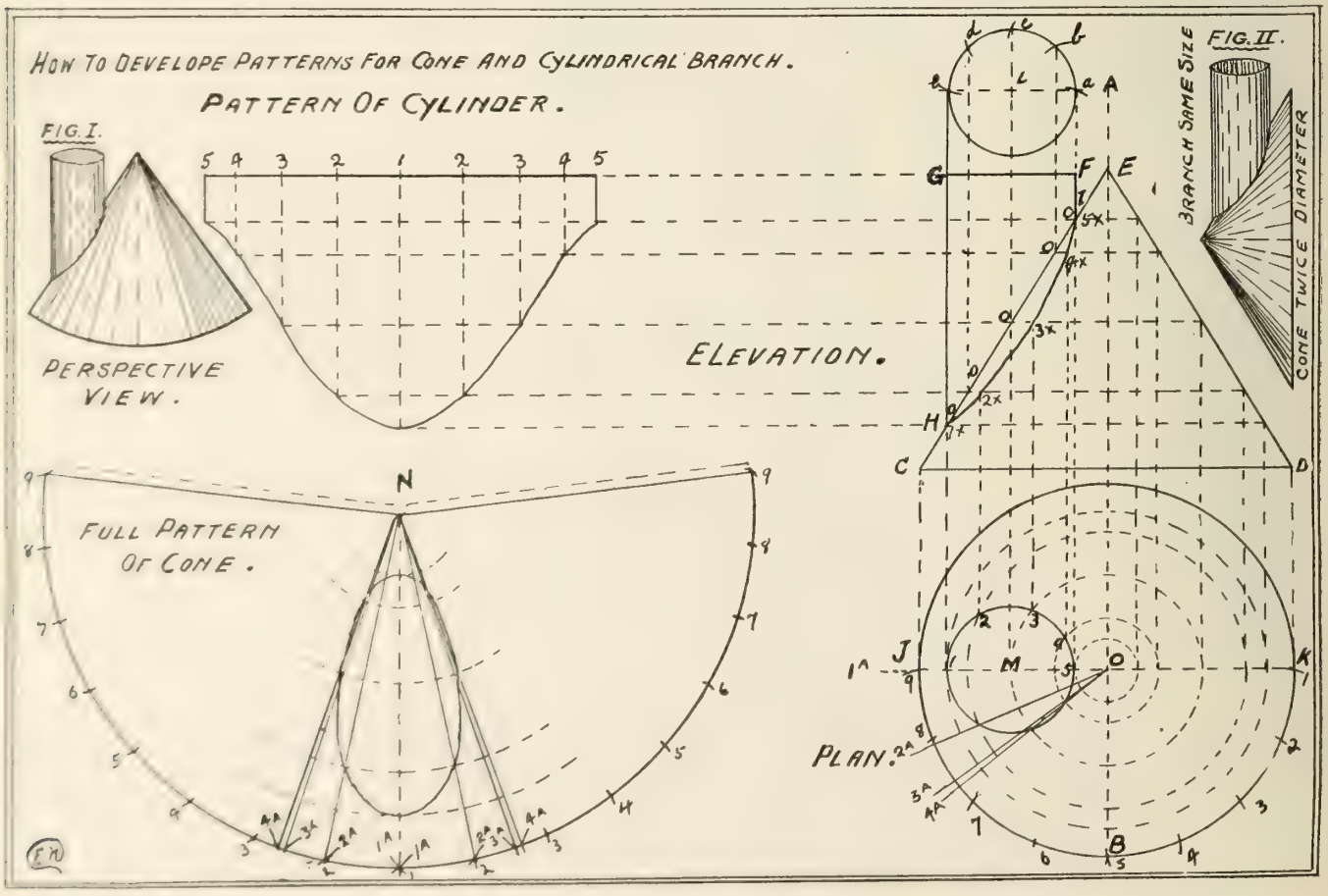


By CHARLES SEIVERS

IN this article I will show how to develop the cone and branch of a local vent. The method adopted is very similar to that used when developing the pattern of a branch which requires to fit a cylindrical pipe at an angle. It is such practice which gives the tinsmith or sheet metal worker actual knowledge along other lines of pattern development. Fig. 1 shows a perspective of the article to be developed. Fig. 2 shows a cone of a slightly different shape, but one which the same pattern of branch will fit, for the simple reason that the slopes are the same, except that the position of the branch is reversed, Fig. 1 being a vertical branch, while Fig. 2 has a horizontal branch; both are used for local vents, but fit various conditions.

First of all, the plan and elevation should be drawn on thick paper and measurements decided upon. These may then be transferred to the metal pattern. Draw plan and divide lower half as shown by 1, 2, 3, 4, 5, 6, 7, 8, 9. Next erect center line upward, said line being center of cone in elevation. Next describe elevations as follows: C, D, E, F, G, H, I, the points C, D, E being the outline of cone and F, G, H, I the branch. Next erect dotted lines upward from G, F and determine the center; then from center L make circle, which is plan of branch. Divide upper half of this circle with four equal parts, as shown in a, b, c, d, e. Next draw dotted line downward from a, c, e, to a dotted line, J, K on plan, and b, d downward as far as slant line I, H on side of cone. Next draw six horizontal dotted lines as follows:—First or top line in line with G, F; second, from I, which must extend across cone and all the other dotted lines as shown until H has been reached. Next step will be to erect vertical dotted lines from points on side of cone which the vertical lines intersect. These lines are required to determine the inner circles shown in plan. Next draw the inner circles. Having done so, describe another smaller circle, making M center, which is center of branch; then mark points where larger inner circle intersects small circle as shown 5, 4, 3, 2, 1. These figures determine the stretch-out measurements required for pattern of branch, therefore the next step will be to transfer these measurements twice to the horizontal line which is extended from top line G, F as shown, 5, 4, 3, 2, 1, 2, 3, 4, 5.

(Continued on page 41.)



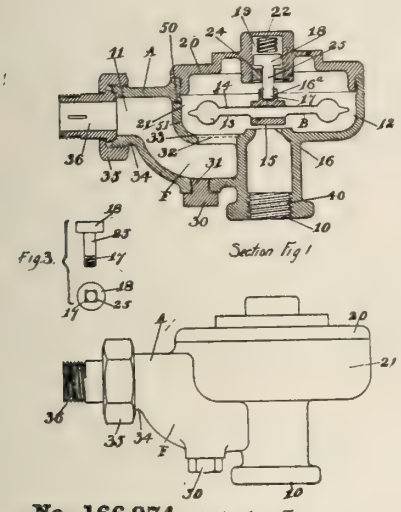
New Canadian Patents

No. 166974

Wilbert E. Clark, Toronto, Ontario, Canada, 4th January, 1916; 6 years. Filed 30th January, 1915. Receipt No. 247,514.

Claim.—1. A thermostatic vacuum trap, comprising a chamber having an inlet and an outlet, a thermostatic member adapted to control the outlet, a trap chamber having a pocket forming a water seal between the outlet and inlet, and a clean-out plug in the trap between the inlet and the outlet of the chamber.

2. A thermostatic vacuum trap having an outlet, a valve seat for the same, a thermostatic member carrying a valve



No. 166,974.
Thermostatic Vacuum Trap

adapted to co-operate therewith, and means yieldably supporting the thermostatic member.

3. A thermostatic vacuum trap having an outlet, a valve seat for the same, a thermostatic member carrying a valve adapted to co-operate therewith, and a spring plunger yieldably supporting the thermostatic member.

4. A thermostatic vacuum trap having a thermostatic member, and means for adjustably and yieldingly supporting the same.

5. A thermostatic vacuum trap having a thermostatic member, and means for adjustably and yieldably supporting the same, said means comprising a plunger having threaded engagement with the thermostatic member, a cylinder adapted to receive the plunger, and a spring in the cylinder adapted to hold the plunger in normal position .

6. A thermostatic vacuum trap comprising a casing having an inlet and outlet, a thermostatic member controlling the outlet, a water trap between the inlet and outlet, a strainer in the water trap, a removable cover having a cylinder therein, a plunger in the cylinder, a spring holding the plunger in normal position, means for adjustably connecting the plunger to the thermostatic member .

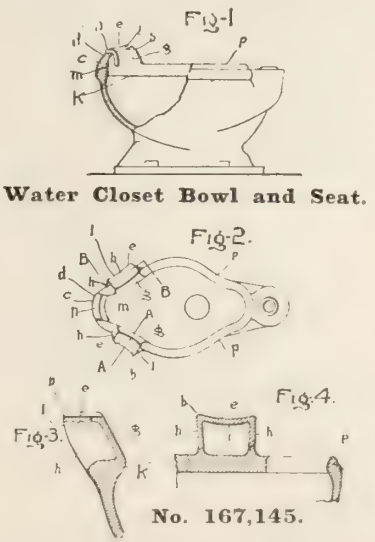
7. A thermostatic trap comprising a thermostatic chamber having an outlet and an inlet, and a trap chamber between the outlet and inlet, a thermostatic control valve, and means permitting a portion of the steam to pass direct to the thermostatic chamber without passing through the trap.

No. 167,145

John Barrett, Montreal, Quebec, Canada, 18th January, 1916; 6 years. Filed 4th March ,1915. Receipt No. 248,713.

Claim.—1 A monolithic combined water-closet bowl and seat, the seat consisting of a pair of concaved leg rests located near the front of the bowl, and a front vertical deflector intermediate of the leg rests.

2. A monolithic combined water-closet bowl and seat, the seat consist-



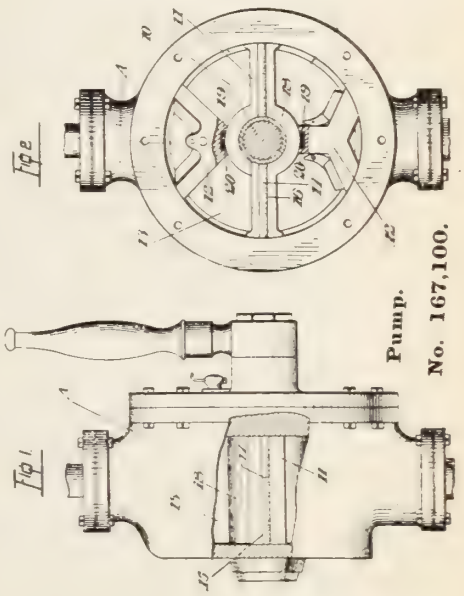
Water Closet Bowl and Seat.
No. 167,145.

ing of a pair of concaved leg rests located near the front of the bowl, and a front vertical deflector intermediate of the leg rests, the rear surface of which has a vertical concavity bisected by a horizontal concavity, and the upper portion thereof overhanging the lower portion.

No. 167,100

George M. Wilson, Hampton, New Brunswick, Canada, 11th January, 1916; 6 years. Filed 8th October, 1915. Receipt No. 256,806.

Claim.—In a semi-rotary pump and



Pump.
No. 167,100.

in combination, vanes having recess in the lateral faces thereof, a vertically extending dividing wall in the pump having transversely extending recesses therein, and strips of resilient packing in the said recess adapted to engage the inner periphery of the pump casing and the hub respectively, substantially as described.

WHAT THE PRICE OF BRASS GOODS.

With antimony worth eight times its normal value, zinc three times and copper double, and prices on all new metals very high, smelters and refiners of scrap and waste metals experienced the greatest period of prosperity during 1915. How did sanitary and heating engineers come out? We know of quite a few who "bought low, sold low, now they are" paying high and cannot sell at present high prices. All prices should be governed by market quotations prevailing at the time of sale.

The Canadian National Exhibition pays an annual surplus to the City of Toronto of $25,000 to $60,000. Last year the dividend was $45,000.

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VOL. X. SEPTEMBER 1, 1916 No. 17

INVESTIGATE

THE trouble with estimating free is that 90 per cent. of the specifications drawn up are so vague that the amount of a tender greatly depends upon one's conscience, a sanitary and heating engineer who knows his business from A to Z knows what it costs him to do business, pay his debts and instal none but high-grade goods, will, no doubt, submit a higher price that the fellow (we can't call him a sanitary engineer), who knows nothing about those things mentioned.

But what should be done is, that every reputable sanitary and heating engineer should furnish a bill of quantities or name the goods he intends to instal, along with a gilt edge guarantee with the installation, and when the sad reply, "Oh, you're too high," is handed out, investigate, find out the kind of goods the other fellow intends to instal, etc. Go further than that. Watch the job if possible. Keep a record of it and the trouble will nine times out of ten prove worth while.

The public need rescuing from themselves, they need the best goods in their homes, but do not know the difference until too late therefore it would be well to watch and safeguard those who cannot safeguard themselves.

Show a prospective customer the difference between high-grade goods and labor and poor work and poor material.

JUNK

A CERTAIN person called at the store of a sanitary and heating engineer some time ago and asked to see a tap suitable for a lawn tap. He was shown a high-grade sink cock for iron with a hose bibb. The price asked was $1.75.

"Haven't you anything cheaper," he asked, "which will answer the purpose?" "Well," replied the sanitary engineer, "I have a few odd taps here which I can sell for $1," and with that produced a poor, cheap Fuller faucet, the old style, the type which has resulted in putting Fuller work off the market, and the customer bought it.

Can anyone justify such an action? Not if they have any conscience. Such junk should be melted up and not sold to the public who know no better. The fact is, that in this case the sanitary engineer sold a piece of junk, plus his reputation for $1, and this is being done every day by men who either cut prices or try to meet the price rather than maintain quality. The sooner the respectable members of the craft resent such actions by publicly showing up such deals, the better? Moral, don't sell junk either in the shape of brass goods or reputation, unless you sell it to the junk man. He knows what he is buying, the public very often do not.

THE PRESENT CREDIT SYSTEM

HONEST competition is no doubt the life of trade. Competition is that something which spurs one on to higher things, if the competition leads to lower things and regions.

There should be a law imposing heavy penalties upon the man who takes or accepts goods from another on the understanding that he will pay for those goods and who then neglects his business to such an extent that the goods are never paid for.

But how can these conditions be remedied?

For a reply we would refer our readers to the article on page 13, which shows what is being done in several American cities. The article gives facts as they stand to-day in those cities mentioned. It shows that the man who does not attend to his collections in a proper business-like manner does not procure goods. There is no sharp practice resorted to and unfair or dishonest competition is almost an unknown quantity.

Any man can do a cheap job for the public if he either does not pay for the goods he installs or does not give fair value, but neither of these classes of men are friends of the people. The public are beginning to see that they cannot procure first-class workmanship and high-grade goods unless they pay the price. Every householder is looking askance at the cheap Jack. And just as soon as material is placed at a higher value than handing it out to every mushroom plumber in the land, just so soon will those who do business on the level come into their just dues, and no one will suffer. The public will be better served and the title of robber will have vanished from the people's minds when they think of a sanitary and heating engineer.

EDITORIAL BRIEFS

DON'T forget that if you sell junk you are only a little higher than the junkman, but lower in principle.

* * *

DON'T take for granted that your price was too high, may be your goods were higher in quality which means that your price was lower.

Rural Sanitation

A Continuation of the Sanitary Science Course That Has Been Appearing in the Sanitary Engineer, But Having Particular Reference to the Sanitary Disposal of Household Wastes in Unsewered Districts

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 9

Flushing Devices

A SUB-SURFACE irrigation system of sewage disposal is a comparatively simple method to instal. Yet there are many important points which must be considered in the design if successful and continued operation is to be obtained. Some of these points have been already discussed at some length in these articles, and others are yet to be taken up.

Of great importance is the automatic flushing device in any installation. The advantage, and in nearly every case, the necessity for such a device has already been taken up in previous articles; it is the different kinds of flushing devices with which this article is concerned.

Flushing devices may be broadly classified as—**1, Non-automatic; 2, automatic.**

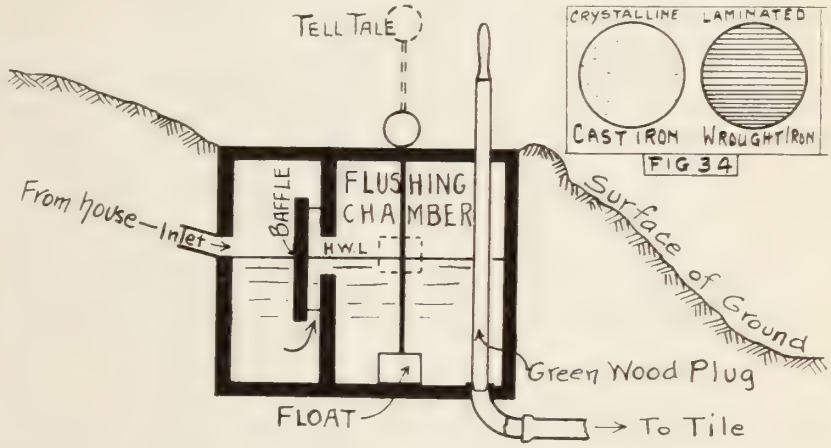
Non-Automatic

With this class of flushing device we are but little concerned. Hand operation is troublesome, while automatic flushing devices add comparatively but little to the original cost of a sewage disposal plant.

Figures 29, 30 and 32 show installations in which the flushing chamber has to be discharged by hand. In the disposal tank shown in Fig. 29, the outlet from the flushing chamber is ordinarily closed with a wooden plug. When the position of the "tell-tale" target indicates that the chamber is full, the wooden plug can be raised and the contents will flow into disposal tile. Fig. 30 shows a system of sewage disposal illustrated in one of Wm. Paul Gerhard's books on sanitation. There are three flap valves which can be operated in turn by hand. Fig. 31 shows an enlarged view of a flap valve suitable for such an installation. With the pressure of liquid in the chamber acting against the valve, the thin metal of which it is composed comes to an even seat on the bevelled end of the pipe, allowing the escape of but little or no sewage. In Fig. 32 a valve is shown, which could easily be cast at any local foundry. A leather washer keeps the valve from leaking. It would be very difficult to lift a valve of this sort if the valve were large or the depth of sewage great on account of the pressure of the liquid on the top of the valve; its use is consequently restricted to small installations. Hand operated gate valves may also be used for emptying sewage tanks.

Automatic

There are a number of kinds of automatic flushing devices used which may be grouped as follows:—



A SIMPLE FLUSHING DEVICE

FIG. 29

1. Tilting or rocking buckets and channels operated by the weight of the liquid or by floats.
2. Valves operated by floats, levers, and other mechanical contrivances.
3. Syphons set in operation by pneumatic or hydraulic pressures.

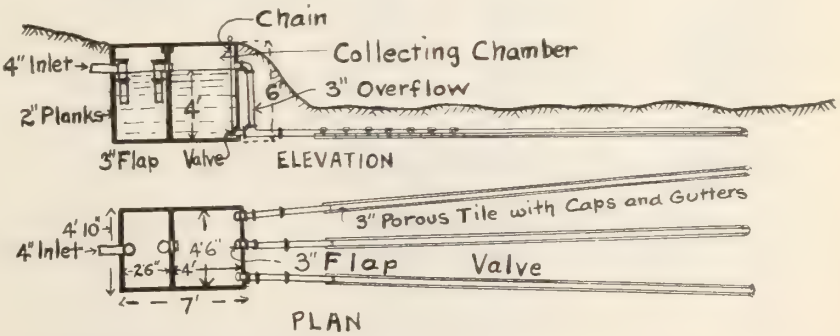
Tilting Apparatus

Fig. 33 shows a simple tilter installed. When empty, the weight of the bucket is so proportioned that it rests upright. As it fills with liquid, the centre of gravity, due to the sloping side, gradually shifts, until, when nearly full, it is past the bearings and the bucket tilts, emptying the liquid. For small installations this is probably the most practicable of such devices.

Valves

The two main classes of automatic flushing devices are valves and syphons. In the first class there must be moving parts; in the second none are necessary. For sewage disposal work the syphon ranks high in popularity above the valve. "Not that we love valves the less, but that we love syphons the more."

The advantage of no moving parts, with the result that there is nothing to break or get out of order, has put the rugged syphon to the fore for sewage disposal plants of all sizes. Another advantage is that the syphon is of cast iron, probably the best metal to withstand acids if, or when, generated in sewage.



A SIMPLE SYSTEM OF SEWAGE DISPOSAL

FIG. 30

The theory as to why cast iron withstands rust and corrosion was explained in the Engineering News of November 4th, 1915, as follows:—

"A new explanation for the claimed longer life of buried cast iron over rolled steel or iron pipe was given in a paper presented before the annual meeting of the American Foundrymen's Association by R. C. McWane and H. T. Carson, of New York. The initial rusting of cast iron is pictured as taking place rapidly owing to the impurities in it like phosphorus, sulphur, silicon, etc. But the rusting soon stops since the undisturbed crystals are held together at one or more points by metallic bonds, and the surface rusting is so intermeshed with the irregular aggregations of crystals that the force excited by absorbed moisture is not sufficient to separate the crystals and the oxide. The rust, therefore, remains as a protective coating. Rolled metals, on the other hand, are pictured as having their original structure destroyed and as consisting of a series of laminations and leaves which are easily destroyed when rusted."

Fig. 34 shows in a diagrammatic way the comparative structure of cast and wrought iron in accordance with the above theory.

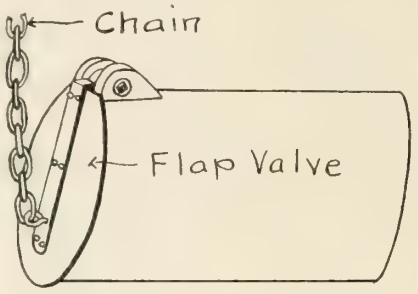
It is claimed that brass, which is a component part of most valves, will quickly corrode under the action of sewage, making the life of a valve comparatively short.

Though the superiority of the syphon for sewage works must be admitted, yet some ingenious valves have been designed, among which the Quinn valve ranks high (see Fig. 35). Its action was described in The Sanitary Engineer of 1st February, 1915:

The Quinn valve operates in a very simple manner, very much after the style of an ordinary w.c. tank. As the fluid rises in the tank it operates the ball, which, as will be seen, releases the bell. This bell comes into contact with a brass rod which is attached to the lower copper ball or float, at the bottom of which is fitted a rubber feather-edge washer. As soon as the fluid is emptied, the float falls back into its place lowering the bell, and the valve is again closed.

The principle is very simple, well understood by all sanitary engineers, and yet as far as the writer knows, no sanitary engineer ever tries to make up his own valve—if a valve is to be used, he buys it from a reputable manufacturer. But in the case of the syphon, where possibly fewer understand the principle or principles involved, how many are the attempts to 'make up' a syphon!

A search of patent records would show



ENLARGED VIEW OF FLAP VALVE

FIG 31

many different kinds of automatic valves operated in various ways. Experience has shown, however, that all in time are liable to clogging of the moving parts, and frequently difficulty in keeping the valve well closed is encountered. It is, therefore, not necessary to take up in detail any other valves, and we pass on to a discussion of the principles upon which an automatic syphon operates.

Syphons

From the Encyclopædia Britannica:

"Siphon or syphon (Lat. sipho a tube), an instrument usually in the form of a bent tube for conveying liquid over the edge of a vessel and delivering it at a lower level. The action depends upon the difference of the pressure on the liquid at the extremities of the tube, the flow being toward the lower level and ceasing when the levels coincide. . . . The simple syphon is used by filling it with the liquid to be decanted, closing the longer limb with the fingers and plunging the shorter into the liquid; and it must be filled for each time of using. Innumerable forms have been devised adapted for all purposes, and provided with arrangements for filling the tube, or for keeping it full and starting it into action automatically when required."

In order to thoroughly grasp the principle or principles upon which automatic syphons operate, it is well to first understand clearly the reason for the syphoning of liquid in a simple non-automatic syphon. There are two terms: atmospheric pressure and vacuum, the meaning of which it is necessary for the reader to know. In article 6 of the Course in Sanitary Science (see issue of 15th June, 1915, The Sanitary Engineer) some facts were given in relation to the atmosphere or the air surrounding the earth which the reader might consult.

Air has weight and presses on the surface of the earth. At sea level this pressure (known as atmospheric pressure) is ordinarily about 14.7 lbs. per sq. in., but may vary nearly ½ lb. per sq. in. depending on weather conditions. At 3½ miles above the earth the pressure is only one-half that at the surface. Near the earth's surface, however, there is no appreciable change in atmospheric pressure, due to a change of a few feet in elevators.

The Barometer

The barometer is a simple instrument used to measure atmospheric pressures and record its variations. It consists generally of a column of mercury held up by atmospheric pressure in a tube closed at the upper end and immersed in mercury at the lower end. Thirty inches of mercury gives as great a pressure per sq. in. as does the whole fifty miles or more of air above the earth. If a tube 36 inches long is filled with mercury and the open end immersed six inches in mercury, then at sea level the mercury will be just at the top of the tube. Raise the tube, say, three inches, and what happens? The mercury still stands in the tube 30 inches above the level of the mercury in which the tube is immersed, but in the three inches above the mercury in the tube, what is there? The answer is nothing, or, in other words, a vacuum. As the barometer is taken to higher altitudes, the mercury drops, and the size of the void or vacuum increases until if 50 miles above the earth could be reached nearly all the mercury would leave the tube. The dropping of the mercury is in proportion to the atmos-

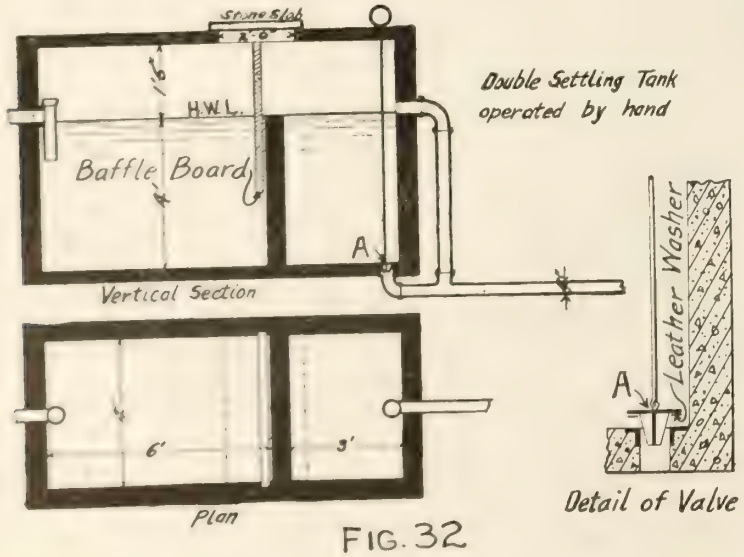


FIG. 32

pheric pressure and the barometer can be graduated to indicate the exact variations in atmospheric pressures, whether due to weather conditions or change of altitude. If a water barometer were used, it would be found that the column of water would stand at about 34 feet at sea level. (Mercury is about 13.6 times heavier than water, and 13.6 times 30 inches is 34 feet.) If the tube con-

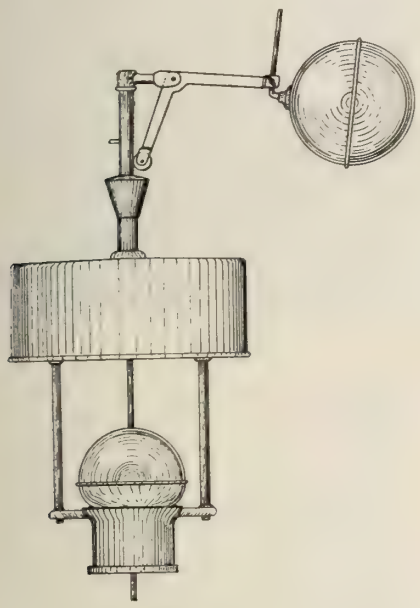


Fig. 35.

taining the water were 40 feet in height above the water in which the end of the tube was immersed, then there would be a void or vacuum of six feet in length at the top of the closed tube, in which there would be neither water nor air, nor any other material.

The Simple Syphon

With an understanding of the terms, atmospheric pressure and vacuum, the cause of the action of the simple syphon with its limitations can be explained in reference to Fig. 36. If the pipe EABCD is stopped at both ends, filled with water, the end EAB immersed in a tank of water, and the stoppers removed, then the water will flow out of the tank under the following conditions:—

(1) As long as the level of the water in the tank is higher than D.

(2) And provided that the distance between the water level in the tank and the highest point B of the syphon is not greater than 34 feet (theoretically, but practically about 28 feet) at sea level.

At the level of the water surface A the upward pressure in the arm AB of the syphon is the atmospheric pressure, while the downward pressure is the weight of the water column AB. The upward pressure at the point D is also the atmospheric pressure, and the downward pressure is the weight of the water column DC. The resulting pressure at any point will be the atmospheric pressure minus the pressure of the water column at that point, and if the column CD is longer than the column AB, the resulting upward pressure at A will be greater than that at D, and the water will be forced from A to D.

It is evident that unless the pressure due to the liquid column AB is less than the pressure of the atmosphere there will be no flow of the liquid. Hence a syphon cannot raise water more than 34 feet nor mercury more than 30 inches under normal conditions at sea level.

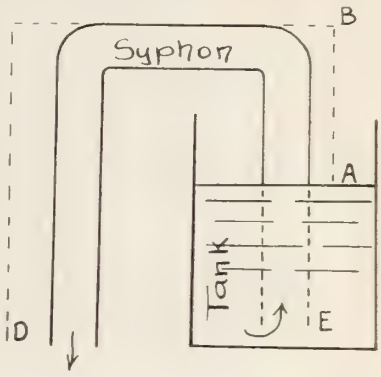
EA may be any length, but the motive power or head which causes the flow in the syphon is the difference between CD and AB. Consequently the further D is below the surface A of the water the more rapid will be the flow. As the surface of the water in the tank sinks to the level of D the flow becomes less rapid and eventually stops. Any portion of the arm EAB below the level of D is, therefore, useless for syphoning purposes.

If the pipe EABCD is not filled with water before placing it in the tank evidently there can be no syphoning of water from the tank. Only if the tank can be filled up to level of the bend in the pipe can water flow out of the arm CD, which then acts as a simple overflow pipe. If, however, at this stage water could be added fast enough to the tank to completely fill the pipe EABCD driving out all the air, it would again act as a syphon.

(Continued in next issue.)

NEW SMOKELESS DOWNDRAFT FIREBOX BOILER

The Warden King Co., have put on the Canadian Market a new smokeless downdraft boiler known as "The Weil" boiler. It is a steel constructed apparatus and is fully described in a new cata-



A SIMPLE SYPHON

FIG. 36

logue now being distributed by the above named company. The book also contains other very useful data to heating men and can be procured by dropping a post card to Warden King. Co., Montreal, or 200 Adelaide St., W. Toronto.

Canadian National Exhibition attendance record: 1909, 752,000; 1910, 837,000; 1911, 926,000; 1912, 962,000; 1913, 1,009,000; 1914, 762,000; 1915, 864,000.

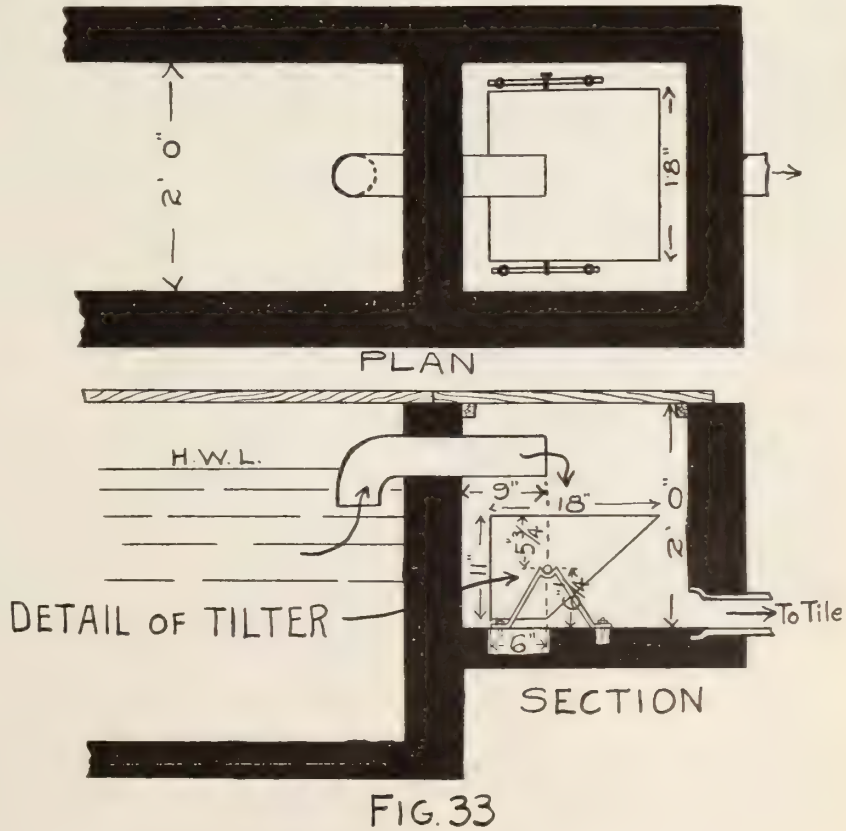
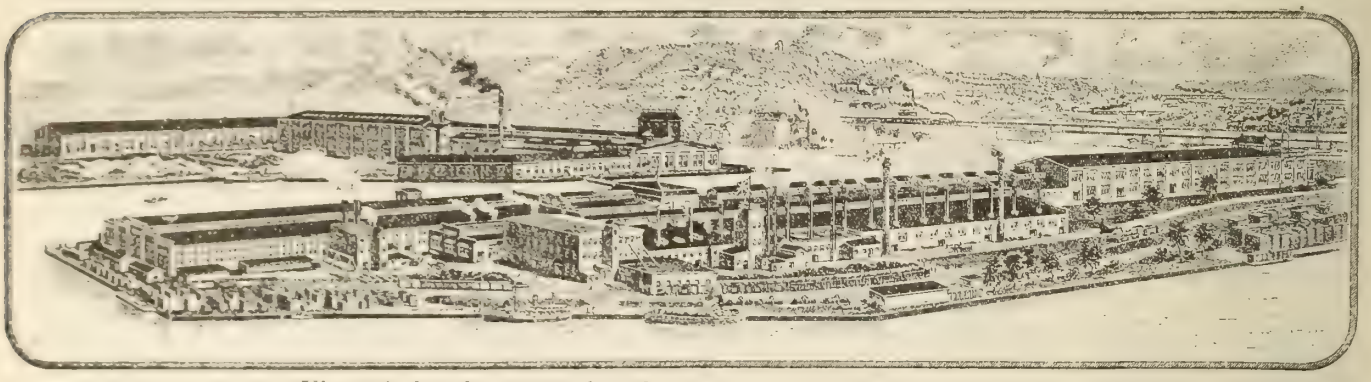


FIG. 33

Standard Ideal Changes Hands

Well-Known Men in the Trade Take an Active Interest in the Business—Very Promising Outlook Under New Management—A Purely Canadian Company.



View of the plant recently taken over by L. M. Wood and his associates.

For a number of weeks all kinds of rumors have been afloat as to the future of the Standard Ideal Co., Ltd., Port Hope. As stated some time ago in The Sanitary Engineer, the company had become involved to such an extent that the bondholders saw no other course open to them than to foreclose on their security. The next difficult problem with which they were confronted was, to procure a buyer or buyers who could finance an undertaking of this magnitude, but at last this obstacle was overcome to some extent when reserve bids were submitted. On July 20 a public sale brought no better offers and finally a sale was made to a company whose directors are named below, L. M. Wood being the purchaser in the interests of the new company.

L. M. WOOD, president.

The new company will be known from now on as the Port Hope Sanitary Manufacturing Co., Ltd., with head offices at the Royal Bank Building, corner of Yonge and King streets, Toronto.

The price paid for the company's assets is said to be slightly in excess of a million dollars. The new company is capitalized at $1,250,000, and its directors include L. M. Wood, of J. & L. M. Wood, president; R. J. Cluff, president of the Cluff Manufacturing Company, vice-president; W. D. Ross, vice-president of the Nova Scotia Steel Company; W. J. Cluff, president of the Canada Pipe & Steel Company, and M. L. Davies, vice-president of the Standard Chemical Company, directors.

It might not be out of place to give a short history of some of the men behind this important concern, seeing that this is, without doubt, one of the most important transactions that has taken place in the history of the Canadian sanitary and heating trade, and that a number of the directors have played no small part in the progress of the sanitary and heating industry in Canada. The president, L. M. Wood, is actively interested in various capacities in the following concerns:—J. & L. M. Wood, financial agents, Royal Bank Building, Toronto; president, Guardian Realty Company, Limited; president, Standard Chemical, Iron & Lumber Company of Canada, Limited; director, Canada Pipe & Steel Company, Limited; director, Cluff Manufacturing Company, Limited; director, Canadian Consolidated Felt Company, Limited.

He was born in Liverpool, England, April 18th, 1882, son of Joseph and Margaret Wood, of Aberdeen, Scotland. He came to Canada the year he was born, and was given a public school education in Halifax, N.S. In the year 1911 he and his brother John, established their present business. He was also associated with the original issue of the Spanish River Pulp & Paper Company, Limited; arranging the first reorganization of this company; has been interested in the securities of the Cedar Rapids Manufacturing & Power Company, Limited; Riordon Pulp & Paper Company, Limited; Canadian Consolidated Felt Company, Limited; Canada Wire & Cable Company, Limited, and the Standard Chemical, Iron & Lumber Company, Limited, of which he became president in April, 1914.

His favorite pastime is golf. He is a member of the Toronto, Montreal and Halifax Golf Clubs, and a Presbyterian in religion, with Toronto as his home.

In business circles he is looked upon as being one of Canada's shrewdest financial men, which well fits him as president of such an enterprise as that referred to.

R. J. CLUFF, vice-president.

The vice-president, R. J. Cluff, is well

W. J. CLUFF

One of the directors of the new company.
(By Courtesy of British Colonial Press)

known to almost all who have been in the plumbing and heating business for any considerable length of time, and the practical experience with which R. J. and his brother, W. J. Cluff, have had, fits them splendidly for the positions of vice-president and director respectively.

Probably but few members of the trade are aware of the small beginning these men had when entering upon life's way to earn their daily bread.

At the age of 14 years R. J. Cluff started as an office boy with the old Toronto Radiator Co., the general manager being John M. Taylor, of the Taylor-Forbes Co., Guelph. No one could wish for a better or more practical training than that he received while under the supervision of John M. Taylor. Mr. Cluff had been there for 18 years, when he was appointed assistant-general manager, and during his term the concern was reorganized and took on the title of the Dominion Radiator Company.

He then joined his brother, W. J. Cluff, and launched into business under the name of Cluff Brothers, taking up the sole agency for the Daisy boilers in the western provinces. To this date many members of the trade find it hard to disassociate the Daisy boiler from "Bob and Will" Cluff.

The next step taken by these enterprising brothers was the formation of the King Radiator Co., whose sole line were King Radiators.

At a later date this concern amalgamated with the expanded Metal Co., and started manufacturing the King steam and hot water boilers.

The firm of Cluff Bros. then took up plumbing supplies. Still another venture on the part of R. J. Cluff was the organization in conjunction with Somerville of the Canada Pipe & Steel Company, Somerville's interest being later acquired by W. J. Cluff. About the same time the Expanded Metal Co. and the King Radiator Co. amalgamated. The two concerns became reorganized, and Sir Henry Pellatt became interested in the venture, which resulted in Steel & Radiation coming into being, with R. J. Cluff as general manager.

Somewhere around the early part of the year 1913, Cluff Bros. secured an option on the property owned by the General Brass Mfg. Co., and later secured the patent rights in the Vitro w.c. tanks, using the buildings for the manufacturing of the Vitro tanks, the concern being incorporated under the title of the Cluff Manufacturing Co.

The next official to be appointed was that of a general manager from among the directors. The appointment fell to the lot of Fred Armstrong, Toronto. Mr. Armstrong is well known to the Toronto craft and has been actively interested in the sanitary heating, electrical and ventilating business for 32 years in the City of Toronto, and his appointment to the position of general manager will be of particular interest to those who know him. Mr. Armstrong is also on the board of directors in the capacity of managing director and in the dual capacity will play a very important part in organizing the new company.

While general manager of Steel & Radiation, Mr. Cluff took up the manufacturing of shrapnel shell at the outbreak of the war, and his firm was probably among the first to make shrapnel shell in Canada and ship same to the British Government.

In the year 1915 Mr. Cluff severed his connection with Steel & Radiation, and began making shrapnel shell at the plant of the Cluff Manufacturing Co., and about the same time the Canada Pipe & Steel Co. began to make forgings for shell. The next move was to reorganize the two shell interests, which resulted in the forming of a new company trading under the name of the Cluff Ammunition Co.

It will thus be seen that the valuable experience procured by these men cannot fail to be a great asset in the management of the Company.

While a manufacturing and salesmanship experience is no doubt very essential, there is still another element required to make up a strong directorate, that is the element of strong finance, hence W. D. Ross was chosen to fill this position on the board of directors. Mr. Ross is also director, Bank of Nova Scotia; director, Porto Rico Railways; director, Nova Scotia Steel & Coal Co. Was born Little Bras d'Or, N.S., June 20, 1869, son of John Ross and Isabel Mackay. He received a public and high school education at New Glasgow. Took up duties with Bank of Nova Scotia, 1883-1901, successively as manager, Stellarton, N.S.; assistant inspector, head office; manager, New Glasgow; manager, Charlottetown; chief clerk, finance department, Ottawa, 1901-1902; assistant general manager, Metropolitan Bank, Toronto, 1902-1903; appointed general manager, 1903, and served in that capacity until 1914. He successfully conducted the negotiations for the Metropolitan Bank which resulted in the merger of that institution with the Bank of

(Continued on page 31.)

D. W. ROSS

Recently became interested in the taking over and re-organization of the Standard Ideal Co., Port Hope.

FRED ARMSTRONG

Appointed Managing Director and General Manager of the Port Hope Sanitary Manufacturing Co., Ltd.

GOSSIP OF THE TRADE

DISSOLUTION OF PARTNERSHIP

The firm of Thorne & Myers Sanitary and Heating Engineers, Sussex, N.B., have dissolved partnership. The business from now on will be carried on by Harry W. Thorne Himself.

SANITARY ENGINEERS ARE DOING THEIR DUTY.

The accompanying photos show the two sons of M. M. O'Connell, one of Ottawa's leading sanitary and heating engineers.

Desmond O'Connell is shown in uniform and is just 16 years of age, Maurice O'Connell his brother is just 15 years. It is needless to say they are of Irish stock and their father and mother could not prevent them going overseas, where they arrived during March last.

Desmond is a Bugler attached to the Crack 77th Ottawa Battalion, Maurice, drummer in the 224th Forestry Battn. M. M. O'Connell has the honor to be the youngest father in the trade with two boys at the front.. We wish them a safe and speedy return and are sure they will give a good account of themselves. The boys were educated at Mount St. Louis College and Loyola College, Montreal.

Bugler Desmond O'Connell, Ottawa, doing his bit with the 77th Battn.

COMFORT STATIONS

The following significant statement was made by Prof. Wm. T. Sedgwick, President of the American Public Health Association in his presidential address at Rochester last September:

"The most flagrant failure in American sanitation to-day is the almost universal lack of public conveniences or comfort stations in American cities and towns. The stranger within the gates of most American communities seeks in vain for any public sanitary conveniences. If he is well dressed he must be [illegible] to hotels or other semi-public buildings, or if poorly dressed, to saloons or railway stations."

This is a problem that requires very serious consideration by the people of Toronto.

The visitor within our gates and our own citizens when out near home have available on ordinary days the sanitary conveniences provided by departmental stores, railway stations and hotels and in very few locations the public lavatories maintained by the City. This is not a proper arrangement. On Sundays and holidays most of the conveniences available are cut off and the situation will be a whole lot worse when prohibition goes into effect in September. The whole matter should be investigated thoroughly and comprehensive sustained action taken at once. Moreover, as our population increases the accommodation of this kind should be increased also. While we are about it, we should equip the public comfort stations in a thoroughly adequate way. Unquestionably the failure to provide proper facilities for the carrying out of personal cleanliness leads to the transmission of disease.

Recently to prove that the providing of proper facilities leads to better personal hygiene a test was made in public comfort stations in a certain American city with the following results:

"When there was hot and cold water 82 per cent. of the people using the station washed their hands, and with cold water only, this dropped to 28 per cent. When there was soap in a holder 42 per cent. used soap, and when common soap was used this dropped to 16 per cent. When there were individual towels 90 per cent. used them, and with a common rolled towel, this dropped to 60 per cent. When there was no towel at all, only 22 per cent. washed their hands."

NEW REPRESENTATIVE

G. F. Steele who for some years has covered territory east of Toronto for Aylmer Pump & Scale Co. will in future cover the same ground in the interest of National Equipment Company Toronto.

FORT WILLIAM CRAFT HOLD BANQUET IN HONOR OF SERGT.-MAJOR E. D. HIGGINBOTTOM

A very pleasant luncheon took place in the Adanac Hotel, Fort William, recently, where a reunion of old time friends was held, to welcome back from the battle line that best of old scouts, Sergt.-major E. D. Higginbottom, and at the same time, to tender him a farewell on his return to the same strenuous line, to help to finish the task of putting Prussian militarism where it belongs — the quick heap.

A company of between thirty and forty sat down to the banquet at 9 o'clock and after having done full justice to the good things, Inspector S. Macnamara called the company to order, and a smoker with a very interesting programme of speech, song and story was proceeded with.

The toasts of "The King," "The Army and Navy," and 'Our Men in Khaki," were responded to as only a bunch of good fellows can do, while a toast to our friends who were not amongst us but who had made the supreme sacrifice was drunk in solemn

silence and more than one eye was wet, when old pals' names were mentioned.

The speech makers included the following names: Messrs. McRae; Sime, Anderson; Marshall; Cooper; McCurdy; Halton; Culliton; Byrnes; Robinson; Hohnshead and Dlee; whilst the following favored the company with story, song and music: Messrs. Burton; Cleworth; Wilcox; Brayley; McIvor; and

Drummer Maurice O'Connell, Ottawa, attached to the 22nd. Forestry Battn.

last but not least the Guest of the evening with some of his old time ditties. He also gave quite a few reminiscences of his life in the trenches with its hardships and pleasures, and hardships are looked upon as of trivial importance by the boys who are enduring them; he himself had been wounded in the leg but had quite recovered and was now again under orders for active service in the trenches. His one great desire was to get there and help finish the work so well begun, and when the great push comes to be in the formeost ranks when the battle cry will be "Carry on to Berlin."

After singing God Save the King, the meeting broke up in the wee sma' hours of the morning, all wishing our hero God speed and again a safe return.

URGENT CALL FOR RECRUITS

The 2nd Field Company Toronto, have already sent 2000 men overseas, most of these men being skilled in trades.

Now that the allied armies are moving forward, the need for engineers is increasing. The demand in Canada is for 321 Engineers a month.

An army moving is like a city which changes its location from day to day, and men of all trades are required to build these new cities.

Plumbers and steam-fitters are not the least important of these men. There has to be a water-supply, baths for the men, ablution-tables, piping of all sorts and many other things that apply to the plumbing and steam-fitting trades.

Unless our fighting men are well looked after they cannot be kept up to efficiency, and are therefore more likely to fall before the enemy. The work of the military engineer is to keep the fighting machine at its maximum efficiency and thus help to preserve the lives of the men on the firing line.

During the exhibition the engineers are conducting a recruiting campaign on the grounds.

They have a field intelligence office on the water front near the monument, and will demonstrate all sorts of engineering feats and signalling. It will be instructive as well as inspiring. Then to add to the excitment, the Canadian Engineers' own fleet will illustrate the way the new British patrol boat gets after the submarine. They are all real boats, patrol mine-layer, submarine, etc. There will also be submarine mines, throwing columns of water into the air, aerial-bombs, dropped by a flying machine which is operated by Lieut. McLean, who is back from the front. It will be inspiring from beginning to end and it is to be hoped that the campaign during exhibition week will result in the obtaining the desired recruits for overseas.

L. L. Anthes, Major,
Commanding 2nd Field Co.,
Canadian Engineers.

PROMOTED TO MAJOR

The friends of L. L. Anthes of the Anthes Foundry Co., will be pleased to know that he has recently been promoted from Lieutenant to Major, and is now of the 2nd Field Co., Canadian Engineers.

At the outbreak of the war Mr. Anthes saw that it would require every one who had received any military training to take up ond do his bit.

He has left his business to the care of others and when speaking to him the other day he said he was aware that his business was being neglected at present, "But bringing this terrible war to an end is my most urgent business," said he, and no doubt many will agree with friend Anthes. It is the world's most important task and we are sure that those whose previous training has been such as to fit them to fight are and will do all in their work to accomplish it.

There are industries just now which might well be closed down and which are absorbing a lot of men that could be spared to do duty overseas, or assisting in turning out munitions of war. The Sanitary Engineer hopes that the appeal from Major Anthes which appears in another column will not fall upon disinterested ears. The war is everybody's first business, and until it is ended our industries can not prosper economically for all concerned.

MAJOR L. L. ANTHES
Of the Anthes Foundry Co., Ltd., Toronto.

STANDARD IDEAL CHANGES HANDS

(Continued from page 29.)

Nova Scotia. Councillor, Canadian Bankers' Association. Married Susan Archibald McGregor, daughter of Hon. J. D. McGregor, Lieutenant-Governor of Nova Scotia, October 1899 (deceased March, 1909); secondly, Isabel Mackay, daughter of George Forrest Mackay, New Glasgow, N.S., June 3, 1914.

Mr. Ross is an enthusiastic member of the following clubs: Toronto, Ontario, York, Toronto Hunt, St. James' (Montreal). He is a Presbyterian in religion, and a citizen of Toronto.

The whole trade will no doubt feel that a company with such a strong body of men directing its affairs cannot but have a very promising outlook.

All railways in the United States and Canada give special rates and run excursions to the Canadian National Exhibition.

Canadian Gas Association Holds Its Ninth Convention

Most Successful Convention Held Since the Formation of the Association. The Keynote of All the Addresses Were Service and More Service.

ONE of the most successful as well as enjoyable conventions ever held," was the remark heard from those who were in attendance on the Ninth Annual Convention which took place Aug. 16 and 17 at Quebec City. The majority of the members coming from Western Ontario left Toronto on Monday night on the steamer coming all the way down to Quebec by boat. In the day time the party was fully occupied admiring scenery, rapids, etc., and in the evenings card games were arranged and prizes given. A few members of the Convention came by train and altogether including the wives and families of the delegation there were over 150 present.

After registering at the Chateau Frontenac on Wednesday, A.M., the ninth annual convention was opened on the 6th floor of the Quebec Rly. Light and Power Bldg., by Mayor Lavigueur who was introduced by Pres. Wallace. He spoke in French and English welcoming the convention to Quebec. This adress was responded to by A. A. Dion of Ottawa who also spoke in English and French.

For the next hour the convention was taken up with routine business such as minutes of last annual meeting, report of Executive Committee, report of Secretary-treasurer, and Presiden's motion expressing regret at death of one of their members C. H. Osler.

Then followed the nomination and election of officials which resulted as follows: Pres., J. P. King, Stratford, Ont.; 1st. Vice-Pres., J. H. Young, London, Ont.; 2nd Vice-Pres., C. C. Folger, Kingston, Ont.; Exec. Com. R. A. Wallace, Quebec; Arthur Hewitt, Toronto; J. S. Norriss, Montreal; A. A. Dion, Ottawa; T. A. Gardner, Brockville; V. S. McEntyre, Berlin, Ont.

The next business was correspondence which was read by the secretary mainly dealing with regrets being received from John Keillor of Vancouver, Howard E. Mann, Montreal Light, Heat and Power Coy., Samuel Carter, M. P. P. of Guelpr, N. A. Young of James Gardner & Coy., Mr. Swift of the Mueller Coy. of Sarnia, L. R. Dutton of the American Gas Institution and E. H. Gurney of Toronto and James Haines of the Nat'l Commercial Gas Association. Then followed the reading of the paper entitled "Gas Lighting Service," by J. P. Conroy, Manager of the Gen'l Gas Light Coy, New York City.

After this a paper was read entitled, "Is Industrial Fuel Business Worth While," by H. E. G. Watson of the Consumers Ga Coy. of Toronto.

This concluded the meeting for Wednesday A.M., and the business for the day. The afternoon was given over to a trip around Quebec in the observation car as guests of the Quebec Rly. Light and Power Coy. Many points of interest were visited and a very pleasant two hours was spent this way. At four o'clock the special car arrived at the wharf where the ferry boat "North" conducted the party up to the new Quebec Bridge of which a splendid view was obtained. Coming down the river the party was then taken as far as the Dry Dock under construction. One or two other things were observed also on this trip of which however the press censor would not allow mention.

Thursday mornings convention commenced about 10.00 A.M. and consisted of the reading of papers and discussion. Some of these will appear in the Sanitary Engineer at a later date.

The exhibits proved of very great interest not only to the members in attendance on the convention but also to quite a number of the members af the plumbing and heating trade in the city.

Thursday noon saw the close of the convention as far as business was concerned.

In the afternoon the party were taken in two special cars to Ste. Anne de Beaupre where they were shown all the

(Continued on page 34.)

Delegates and friends in attendance at the recent convention held in Quebec by the Canadian Gas Association.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

HOW CAN ADDITION TO SEWAGE DISPOSAL SYSTEM BE MADE?

Editor The Sanitary Engineer

I have been asked to increase the size of a septic tank or lese build another tank to take care of the sewage from a new addition eo an already existing building. The plumbing fixtures will all have to discharge through the one drain, and I proposed to the manager of the concern to install another tank by the side of the first one and connect them together, then put in another 3 inch syphon. The one now flushes every 24 hours and the distance between the high and low level of the fluid in the dosing chamber is about 13 inches. He is however of the opinion that the two syphons will not work at once, because the dosing chamber which receives the overflow from the septic chamber will naturally get the preference and before the fluid leaves the first chamber the first syphon would operate.

The main trouble is that I have to put in an absorption bed in a slightly different direction but all on the same level the accompanying sketch will show you what I am up against.

Is it possible to make the two syphons flush together? If this can be done my troubles I think will be over.

E.S.D.S.

Fig. 1 is sketch submitted by our correspondent, which shows two septic tanks placed side by side, the absorption beds run as shown in different directions. Under ordinary circumstances a larger syphon would answer the purpose except that the level of the tank would have to be altered, and the absorption bed simply enlarged. However to overcome this trouble all that is required is to couple the bells of the syphons, we assume that the syphon now in operation is of the bell type because of it flushing at 13 inches.

Fig. 2 shows how the connections

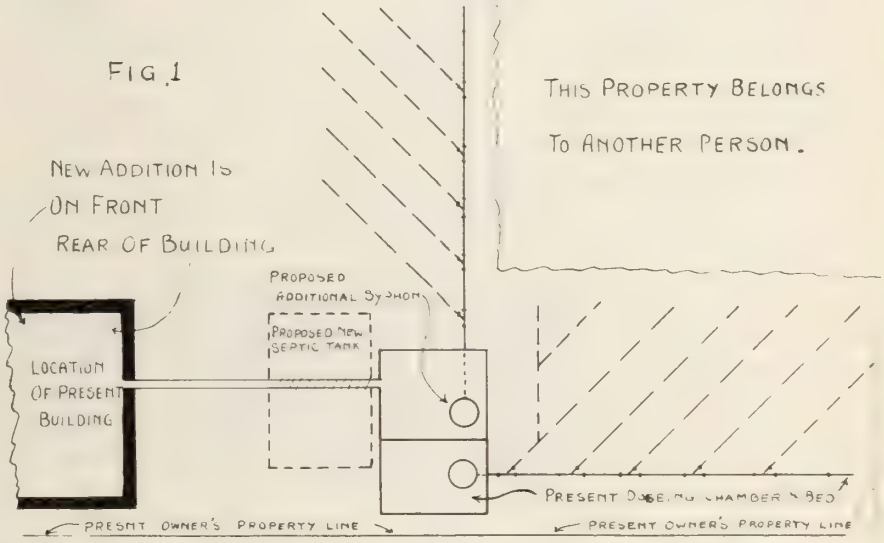


FIG 1
THIS PROPERTY BELONGS TO ANOTHER PERSON.
NEW ADDITION IS ON FRONT REAR OF BUILDING
PROPOSED ADDITIONAL SYPHON
PROPOSED NEW SEPTIC TANK
LOCATION OF PRESENT BUILDING
PRESENT OWNER'S PROPERTY LINE
PRESENT OWNER'S PROPERTY LINE

should be made. It might not be out of place to show how these coupled syphons operate .

The pipe should not be less than 1½ inch diameter, as short as possible, and the joints perfectly tight so as to retain all the air. Then be sure that the syphons are both perfectly level and in line with each other. Next see they are both primed that is the seals of the syphons filled up with water. Place the bells in position and couple at the union which should be metal to metal preferably with bronze faces. No rubber or leather washers to be used. Then as the sewage rises in the two tanks the

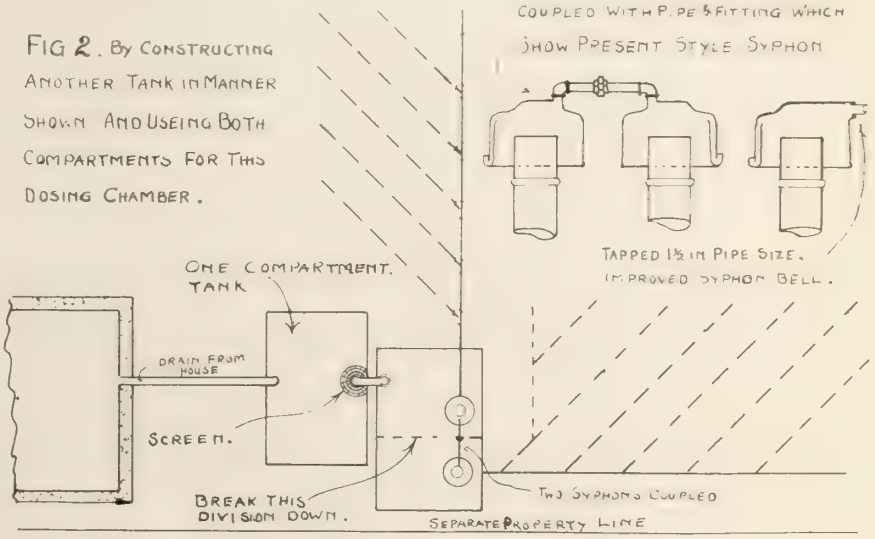


FIG 2. BY CONSTRUCTING ANOTHER TANK IN MANNER SHOWN AND USEING BOTH COMPARTMENTS FOR THIS DOSING CHAMBER.
COUPLED WITH PIPE & FITTING WHICH SHOW PRESENT STYLE SYPHON
TAPPED 1½ IN PIPE SIZE. IMPROVED SYPHON BELL.
ONE COMPARTMENT TANK
DRAIN FROM HOUSE
SCREEN.
BREAK THIS DIVISION DOWN.
TWO SYPHONS COUPLED
SEPARATE PROPERTY LINE

compression of the air in the two bells on the water seals will naturally be the same, this ensuring the two syphons discharging together. It would be well to make two connections between the tanks as shown in Fig. 2 viz. top and bottom.

In connection with this subject it might be well to state that in many cases where a low level tank is required and there is still a big discharge that is where a larger syphon than three inches is used, it would be a very simple matter to install two side by side in one dosing chamber as shown. No doubt if a demand is made the manufacturers of these septic tank syphons will make a specially designed bell with a tapped outlet for the purpose named.—Editor.

Canadian Gas Association Holds Its Ninth Convention

(Continued from page 32)

sites. On the return trip stop was made at Montmorency Falls where dinner was served at the Kent House.

The following is a list of subjects and papers read at the convention which could not fail to be of great interest to those present.

1. "Gas Lighting." By J. P. Conroy, Manager, General Gas Light Company, New York.

2. "What is a Gas Meter?" By J. B. McNary, Manager, Canadian Meter Company, Hamilton, Ontario.

3. "A Comparison of Modern Coal Carbonization Systems." By Vernon Baker, Engineer, D. R. Russell Engineering and Development Company, St. Louis, Mo.

4. "Is Industrial Fuel Business Worth While." By H. E. G. Watson, Consumers' Gas Company, Toronto, Ont.

5. 'The Relationship Between the Accounting and Operating Departments." By H. K. Tennent, Accountant, Quebec Railway, Light, Heat and Power Co., [illegible]

6. "Some Wrinkles on Distribution." By P. B. Lamb, Ottawa Gas Co., Ottawa, [illegible]

The following is a list of the exhibitors who had their various lines displayed in a very interesting and instructive manner.

A. B. Gas Stove Co., Montreal.

Beler Water Heater Co., Pittsburg, Pa.

Canadian Meter Co., Hamilton, Ont.

[illegible] Stove Works, Detroit, Mich.

General Gas Light Co., New York.

International Hale Gas Mixer Co., Detroit, Mich.

[illegible] Supply Co., Quebec

Mueller Mfg. Co., Sarnia, Ont

McClary Mfg. Co., London, Ont.

Pittsburg Water Heater Co., Pittsburg, Pa.

Rudd Mfg. Co., Pittsburg and Toronto

Roberts and Mander Stove Co., Philadelphia, Pa.

Reliable Stove Co., Cleveland, Ohio.

Scientific Heater Co., Cleveland, Ohio.

Standard Meter Co., Toronto.

Gurney-Master Co., Montreal.

PRACTICAL COURSE FOR SHEET METAL WORKERS.

(Continued from page 22)

The next step to take will be to erect lines from the points last numbered, on a downward course until all the horizontal lines are intersected. Then by connecting the same from points where intersections take place, the pattern for branch is complete.

If it is desirable to show points of intersection where branch connects the cone, erect vertical lines from plan which has M as its center, from points marked 1, 2 , 3 , 4, 5 to horizontal dotted lines as shown by points marked 1x, 2x, 3x, 4x, 5x, and connect these intersections as shown by solid line.

We will now turn to the developing of pattern for cone and hole for branch. First place the point of compass at E. on elevation and open up to C; then erect vertical line as shown in full pattern of cone, making N. the centre. Next draw an arc as shown, then transfer the stretch-out measurements shown on plan of cone starting at centre line N. of arc, with 1, 2, 3, 4, 5, 6, 7, 8, 9 on both sides.

This will give the proper pattern of cone; the dotted lines shown on the upper portion of pattern are allowed for lapping the seams over.

I will next describe the pattern for hole necessary for branch. Place the straight edge at center point O on plan of cone and draw straight lines from center O so said lines will cross points where circles intersect, until outer circle is intersected as shown at 1a, 2a, 3a, 4a. Transfer these measurements to the pattern of cone, beginning with 1a at vertical line where N intersects the arc and following on until all the measurements have been transferred as shown. Now place the straight edge at N and draw lines from N to points 1a, 2a and on as shown.

The next step will be to determine the proper points of intersections as described in the arcs. This is done by placing point of compass at E in elevation and opening up to the various intersections marked O on slant line E, C, which will determine the proper points of intersection which is necessary to develop the pattern of hole. Having now transferred the various O measurements, trace a solid line as shown from points where arc intersects the lines drawn from N to 1a and 2a, etc.

This completes the two patterns.

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Puro saves 35% of that wasted water.

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Easily attached—positively fool-proof—and nothing to wear out

An excellent investment—for shop and office alike—and one that pays dividends in real money on water savings and better workers.

Write to-day—now—tell us how many men you have and the number of departments.

We'll make you a complete estimate on an installation—we will also make you a special proposition for a try-out in any one department.

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Puro Sanitary Drinking Fountain Company

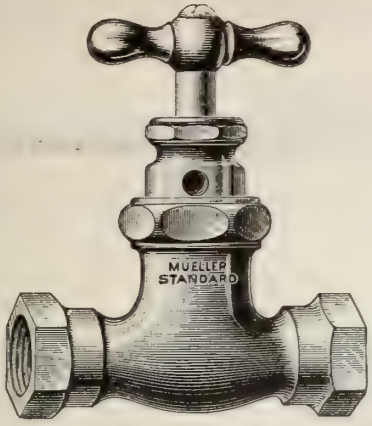
SAFETY FIRST **PURO** ECONOMY ALWAYS

147 University Ave., TORONTO, CAN.

FORCING A HOT WATER HEATING SYSTEM

(Continued from page 21)

cannot be rendered by generators of this kind such as radiators, even below the furnace, badly trapped mains, and mains that are too small. With heat generators it is a matter of increased pressure which comes under the laws of physics. While forced hot water circulation by means of a pump is a question of hydraulics, a pump will circulate the cold water, or very luke warm water, which could not be done by any other means.



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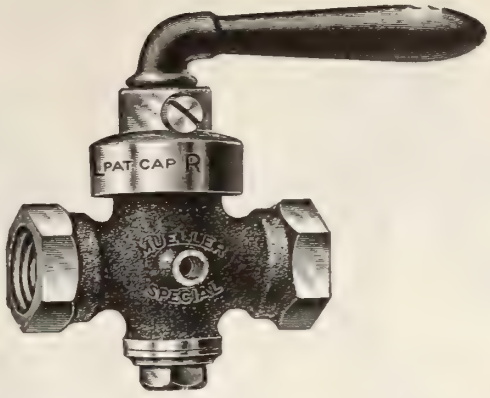
Encased seated washers of the highest grade.

Perfectly fitted threads throughout.

All parts interchangeable.

Pressure is not open to waste when being turned on or off.



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IT is greatly to your interest to use only the very best in stop and waste cocks. Poor stop and waste cocks have cost more to the consumer, as well as the trade, than any other piece of brass goods used in the sanitary and heating business.

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Once operated may be worth several times the first cost.

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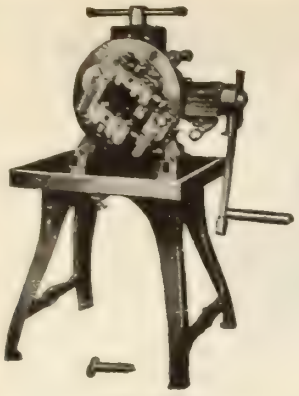

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American or Whitworth Threads.
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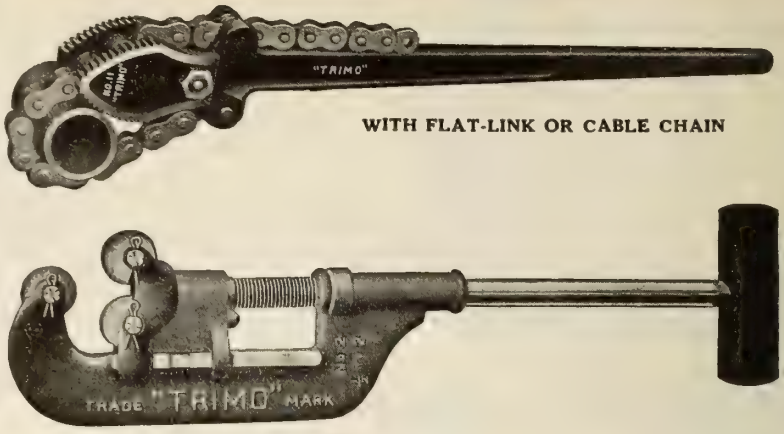

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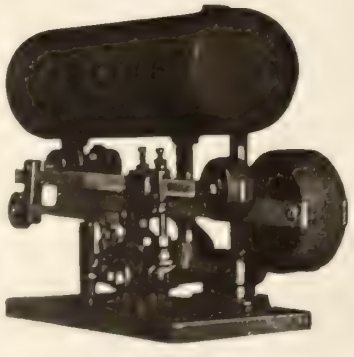

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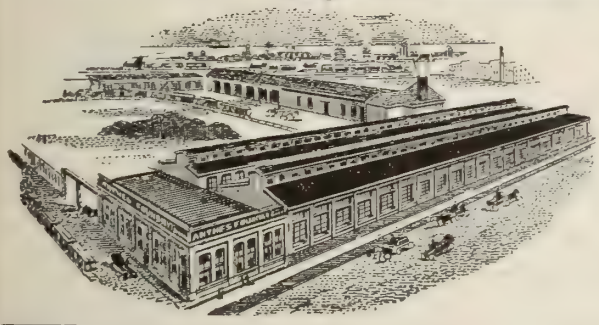

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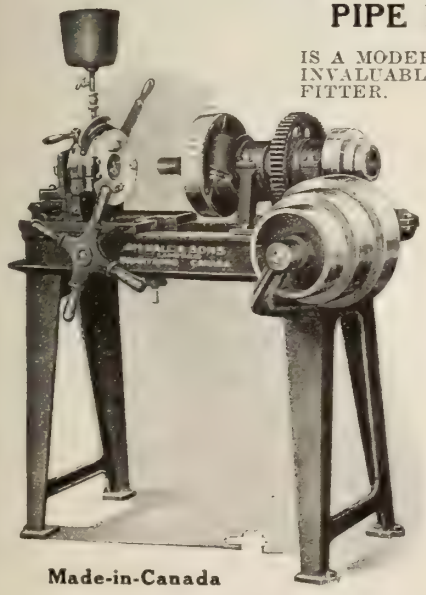

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[illegible] & Co., Toronto.
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Drainage Fittings.
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Darling Bros., Ltd., Montreal.
Lord & Burnham Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Lead.
Canada Metal Co., Ltd., Toronto.
Galt Brass Co., Limited.
Hoyt Metal Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Mixing Valves.
Canada Metal Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Co., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Monkey Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Oil Storage Systems.
National Equipment Co., Ltd., Toronto.

Packing.
Canadian Wolverine Co., Ltd., Chatham.

Packless Radiator Valves.
W. E. Clark & Co., Toronto.
Kerr Engine Works, Walkerville.

Pipe and Radiator Hangers.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.

Pipe, Black and Galvanized.
Canadian Tube & Iron Co., Ltd., Montreal.
Lord & Burnham Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Warden King, Ltd., Montreal.

Pipe Cutters.
Trimont Mfg. Co., Roxbury, Mass.

Pipe Joint Compounds.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

Pipe, Soil, and Fititngs.
Anthes Foundry Co., Toronto and Winnipeg.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Warden King, Ltd., Montreal.

Pipe Threading Tools and Machinery.
Armstong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.
A. R. Jardine & Co., Hespeler.

Pipe Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Porcelain Ware.
Canada Metal Co., Ltd., Toronto.
Amherst Foundry Co., Amherst, N.S.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Pumps.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
Galt Brass Co., Limited.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Radiators.
Lord & Burnham Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., New Britain, Conn., U.S.A.

Radiator Traps (Steam).
Canada Metal Co., Ltd., Toronto.
W. E. Clark & Co., Ltd., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Reducing Pressure Valves.
Canada Metal Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Septic Tank Valves and Syphons.
Anthes Foundry Co., Ltd., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
West Toronto Foundry Co., West Toronto.

Solder.
Canada Metal Co., Ltd., Toronto.
Hoyt Metal Co., Toronto.

Steam Specialties.
W. E. Clark & Co., Ltd., Toronto.
Darling Bros., Ltd., Montreal.
Dart Union Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Wabash, Ind.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville, Ont.

Steam Traps.
Canadian Morehead Co., Ltd., Woodstock.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Geo. W. Cole Co., Toronto.

Smoke Test Machines.
James Morrison Brass Mfg. Co., Toronto.

Tanks, Steel and Wood
Ontario Wind Engine & Pump Co., Toronto.

Temperature Boosters
W. E. Clark & Co., Toronto.

Testing Plugs.
James Morrison Brass Mfg. Co., Toronto.

Tools.
Armstrong Mfg. Co., Bridgeport, Conn.
Canadian Wolverine Co., Ltd., Chatham.
Hall & Sons, Ltd., Brantford.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Nicholson File Co., Port Hope, Ont.
Williams, J. H., & Co., Brooklyn, N.Y.

Unions.
Canada Metal Co., Ltd., Toronto.
Dart Union Co., Ltd., Toronto.

Vapor Heating Systems.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
W. E. Clark & Co., Ltd., Toronto.

Vitro Tanks
Cluff Mfg. Co., Toronto.

Vacuum Systems of Heating.
W. E. Clark & Co., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Water Supply Systems.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Darling Bros., Ltd., Montreal.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

"I Never Have a Complaint After I Install a KING Hot Water Boiler."

Satisfied customers stay with you, and do not run around looking for better service.

KING BOILERS and RADIATORS

will stand up under any reasonable guarantee you can give them. ***Prices and Terms on Request.***

STEEL AND RADIATION, LIMITED

Mfrs. Steel Sash, Concrete Reinforcing, Metal Lath, Steam and Hot Water Heating Systems.

Head Office, Fraser Avenue, TORONTO

ALPHABETICAL LIST OF ADVERTISERS

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Wallaceburg Brass & Iron Mfg. Co. 10

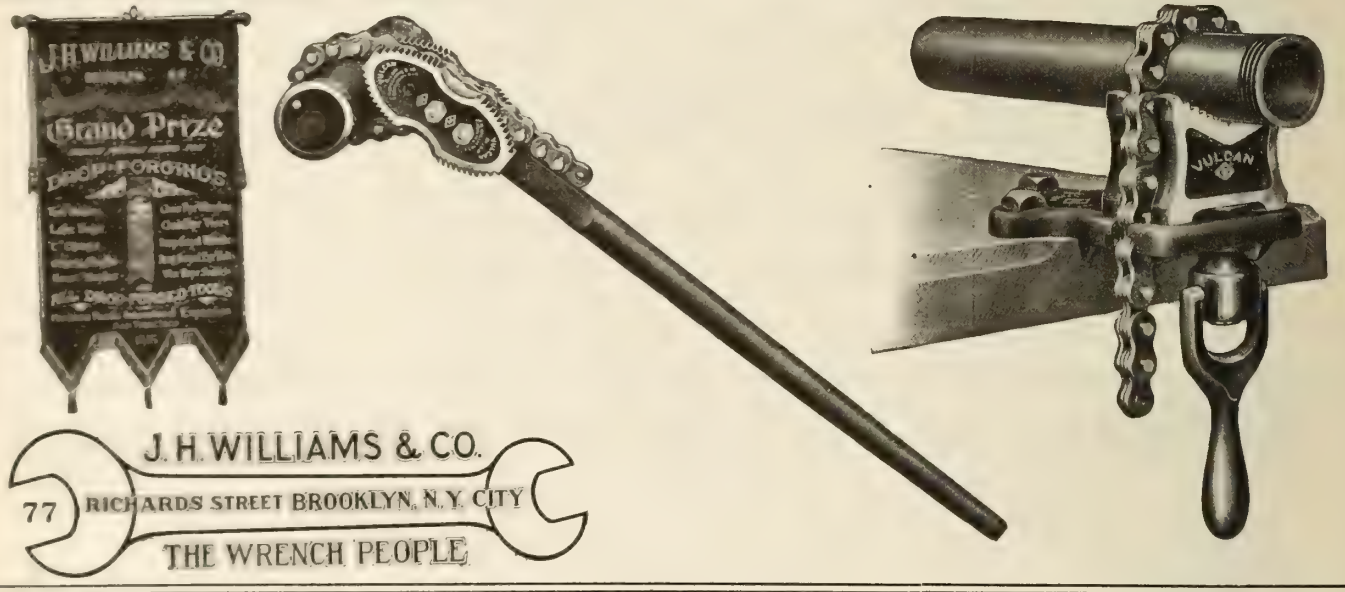
WROUGHT PIPE

BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

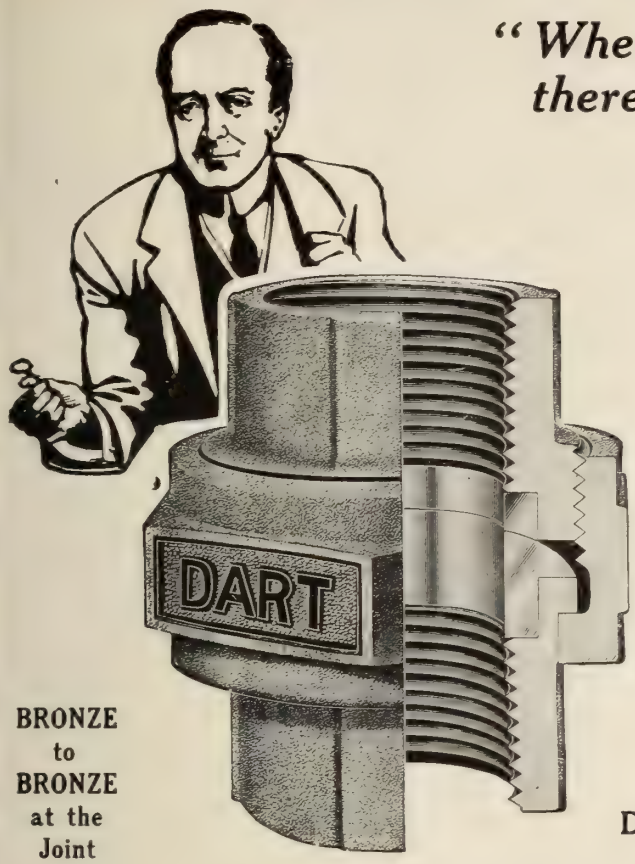
Ask your jobber for Brand

CANADIAN TUBE & IRON CO., LIMITED
Montreal Works: Lachine, Can.



WHEN trade begins to boom it will be exceedingly difficult to jump in, overtake and pass the man who continued, even in times of depression, to paddle his advertising canoe.

It will require a high power campaign and lots of anxiety to do it. Even at that the persistent advertiser may beat the other fellow to it.



BRONZE to BRONZE at the Joint

"Wherever a Dart Union is on the job there is distinctive union service"

Give your customers Dart Union service. It's a sure way of winning their confidence and future business.

Dart Unions

are permanently efficient because bronze meets bronze on the faces of the joint, eliminating all possibility of rust or corrosion, and the heavy iron parts will not stretch or pull apart.

Dart Unions will save you time and bother because the ball-shaped seat allows a quickly and easily-made connection, whether pipes are in or out of line, so long as the nut can be started on its thread.

Sold by all supply houses.

Manufactured by

DART UNION CO., LIMITED, TORONTO

Kerr Radiator Valves and Union Elbows

for Steam and Hot Water Heating Systems, possess the proper staying qualities. They are not only up to the minute in appearance, but are there with the quality under the polish and nickel. If you have been in the Heating business any length of time, you should be familiar with Kerr valves.

WORKS AT WALKERVILLE, ONT.

If you are new at the game, we invite you to "get wise" to this line of valves. Our catalogue No. 5, is yours for the asking.

You don't experiment when you buy Kerr valves.

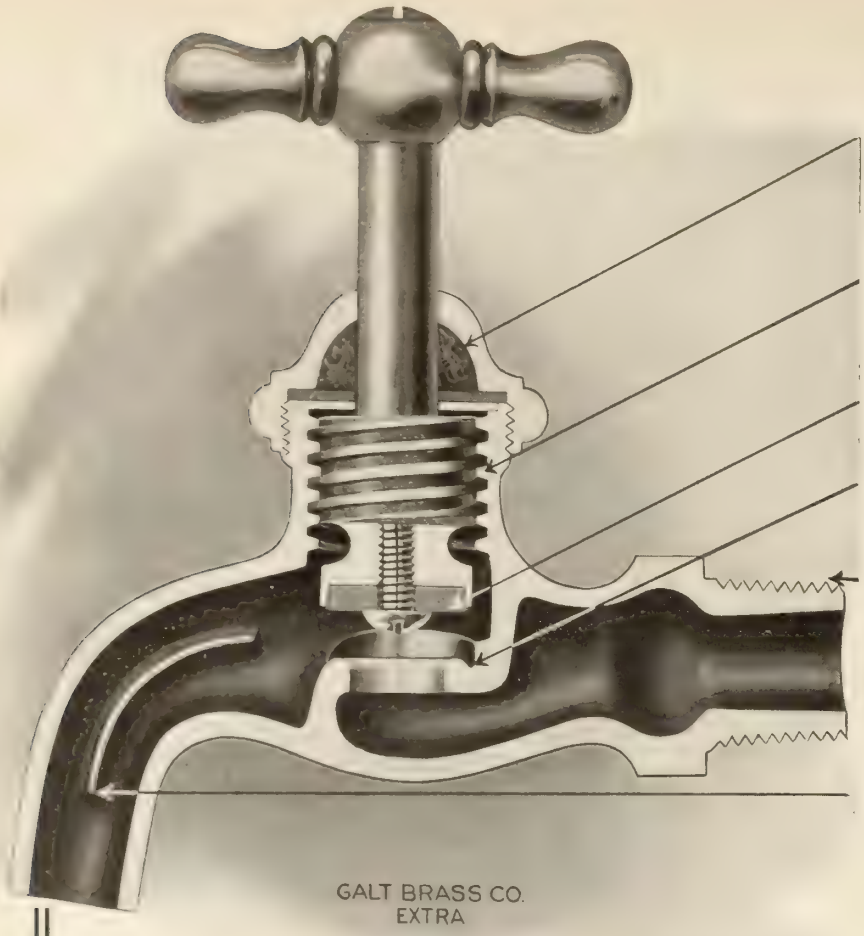
We paid for the experiments long ago.

The Kerr Engine Company

LIMITED

WALKERVILLE, ONTARIO

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. X | Publication Office: TORONTO, SEPTEMBER 15, 1916 | No. 18

FILE COPY

PRESSURE SYSTEM

A. 1903

Empire Hydro-Pneumatic Water Supply Systems

We are creating business for you through our advertising in many Farm and Dairy Magazines. Are you getting your share of it?

The installation of one of our Hydro-Pneumatic Water Systems is of great importance to every owner of a farm or country home, and should be regarded not as a luxury, but as an absolute necessity. It is a profitable investment that pays large dividends right from the start, and adds greatly to the comfort of the home.

We can supply an outfit to suit all requirements.

When you install an Empire Water System you know it will do the work and you are sure of a satisfied customer.

Write us for our Catalogue describing Hydro-Pneumatic Water Systems.

We will have an exhibit at the Western Fair and will be glad to have you call and see us.

FILE COPY

EMPIRE MANUFACTURING CO., LTD.

LONDON TORONTO

The Goods You'll Eventually Buy

Based upon a quality, second to none; you make no mistake in starting now to supply your customers with BEAVER BRAND White Enamel Ware

Ask your jobber for BEAVER BRAND CAST IRON ENAMEL WARE
and build up your reputation

EVERY DOLLAR WE OWN STANDS BEHIND THE GOODS WE MAKE

Amherst Foundry Co., Limited

General Offices and Factory: Amherst, Nova Scotia

WRITE YOUR NEAREST AGENCY

AGENCIES:

ONTARIO:
Monarch Brass Mfg. Co., 71 Brown St., Toronto

MANITOBA and NORTHWEST:
E. B. Plewes, 120 Lombard St., Winnipeg

CANADIAN CONSOLIDATED RUBBER CO. LIMITED
DOMINION
RUBBER SYSTEM
AND ASSOCIATED COMPANIES

A SQUARE DEAL

The policy of the Dominion Rubber System is to provide every need in Rubber Goods, and to give a square deal to every buyer, no matter how small the purchase may be. That means—

A Square Deal in Values as Well as Qualities

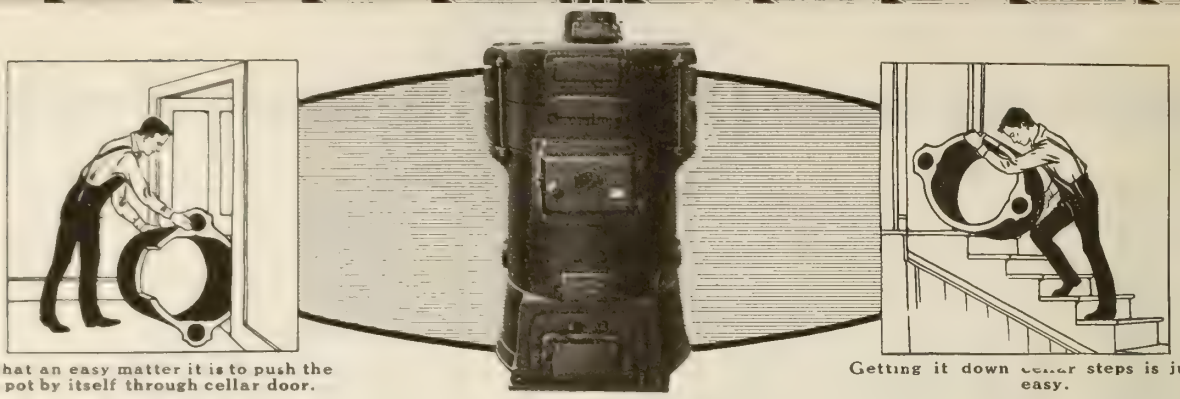
Whether the purchase be a Rubber Nipple for the baby's bottle, a Rubber Shoe, a "Nobby" Tread Tire, a Dominion Raincoat or Garden Hose, we insist that the goods must be absolutely satisfactory.

No matter what the need in rubber may be, write to our nearest Branch or direct to the Head Office.

Canadian Consolidated Rubber Co.

Executive Office—Montreal, P. Q.

28 "Service" Branches Throughout Canada



See what an easy matter it is to push the fire pot by itself through cellar door.

Getting it down cellar steps is just as easy.

IT'S EASY TO GET THE SEPARATE FIRE POT DOWN THE CELLAR STEPS

When fire pot and crown sheet sections are in one heavy unwieldy section, it's often a mighty hard job to get the "big [illegible] through some cellar doors and down some cellar steps. It means a lot of profanity-provoking, wedging, tugging and pulling.

The fire pot and crown sheet are **separate sections** in a Burnham Boiler. To get the fire pot through doors and down steps by itself is a comparatively easy matter. Also it cuts down set-up troubles. And it lessens repair expenses, because when anything happens to the crown sheet or fire pot, it is necessary to replace the injured section **only.**

The Burnham Boiler is different from other boilers in many important respects. Our catalog enumerates them in a straight-from-the-shoulder sort of a way.

Send for it.

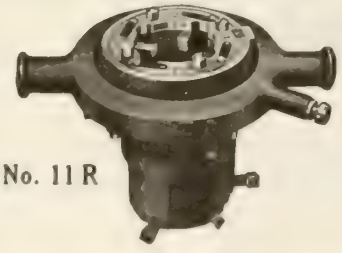
Lord & Burnham Co. Limited of Canada

(Boiler Department)

Royal Bank Bldg., TORONTO

Burnham Cosy Comfort Heat BB

Factory: ST. CATHARINES, ONT.



No. 11 R

"Jardine" Adjustable Ratchet-Threading Tool

Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely [illegible] and, excluding chips and dirt.

YOU CAN REDUCE THE LABOR OF PIPE THREADING 50 PER CENT., AND MAKE THREADS AS CLEAN AND PERFECT AS IF CUT ON A LATHE WITH ONLY ONE CUT WITH

"Jardine" and "Toledo" Pipe-Threading Tools

"Jardine" or "Toledo" dies spare the muscle of the man who does the work, and save money for the man who pays the wages, as they enable one man to do the work of two and costs less for repairs. No cams or jimcracks to wear and get out of order. Cutters that cut, don't squeeze. Set of cutters for each size of pipe. Lead screw ensures perfect pitch and form of threads. Adjustable to all variations of fittings, very durable cutters.

All threads finished at one cut. One man does the work of two.

It will pay you to look well into the merits of the "Jardine" and "Toledo" before placing your next order for tools of this kind.

Write for catalog and full particulars.

We'll gladly supply the names if you wish to have a chat with users in your town.

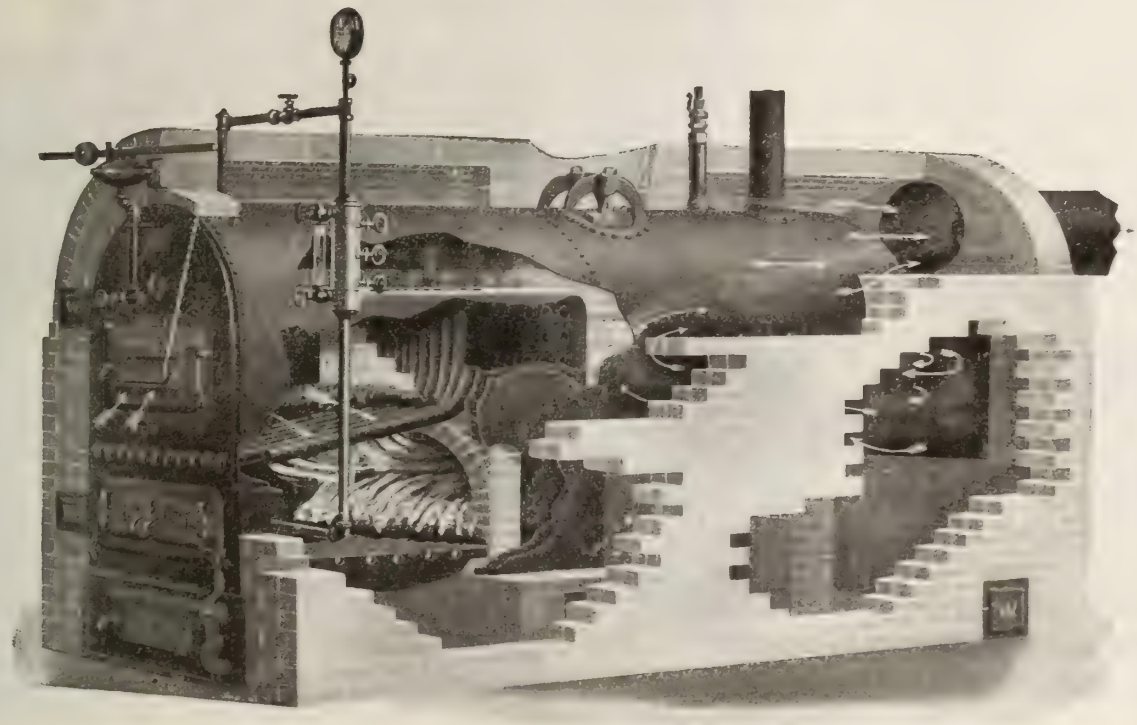
MADE IN CANADA

A. B. JARDINE & CO.

HESPELER, ONT.

Sole makers of "Jardine" Pipe-Threading Tools.
Sole licensees to manufacture and sell Toledo Pipe-Threading Tools in Canada.
Agents, Winnipeg and West—Stanley Brock, Ltd., Winnipeg, Man.
Brockville and East—J. R. Devereux, 233 St. James St., Montreal.

Smokeless and Straight Draft Firebox Boilers



Weil Smokeless Down Draft Boilers burn cheap grades of soft coal, economically and comply with the "No Smoke" by-laws.

Weil Firebox-Straight Draft Boilers burn any kind of fuel economically and with minimum attention.

Both styles are scientifically constructed — the dutch oven increases combustion, the bend tubes permit of natural internal circulation, and have no sediment pockets. We will upon request send literature and quotations.

Daisy and Viking Boilers **Viking Radiators** **Fittings**

WARDEN KING LIMITED

Head Office, MONTREAL **Branch, 200 Adelaide St. W., Toronto**

Pipe, Nipple and Bolt Threading

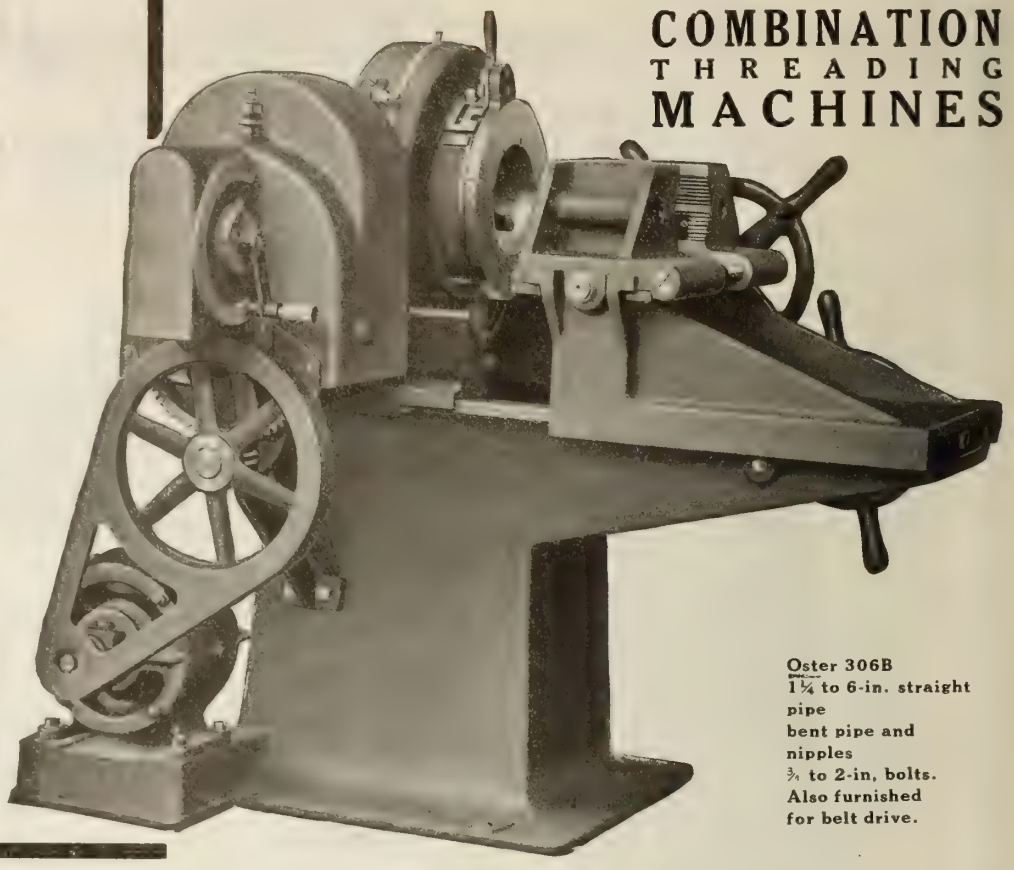
Combine your work of this type—handle it on one compact, speedy, efficient machine—an Oster with the simple fast working die-head shown clearly in the photograph.

If you are interested in finding out just what the capacity of the three sizes of this machine are write for your free copy of

"Actual Pipe-Threading Experiences."

The Oster Mfg. Co.
2084 East 61st Street,
Cleveland, O.

OSTER
COMBINATION THREADING MACHINES

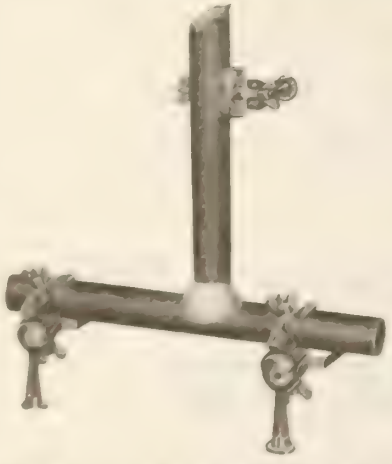


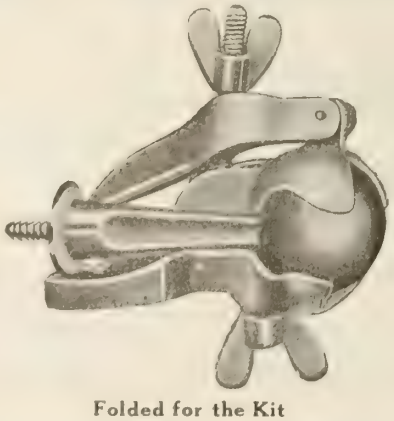
Oster 306B
1¼ to 6-in. straight pipe
bent pipe and nipples
¾ to 2-in. bolts.
Also furnished for belt drive.

"Little Jack" Joint Holders
Cast Brass—Adjustable

Joint Wiping Reduced to a Minimum

"LITTLE JACK" has flexible ball joints and lock nut, therefore articles may be held in any desired position.





Folded for the Kit

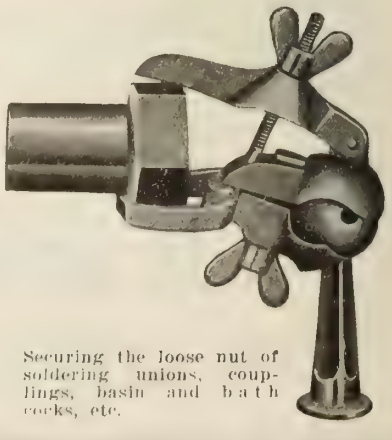
1 Jack . - - $1.15 Net
1 Set (3 Jacks) - $3.00 Net
Postage 6 cents extra.

A PRACTICAL DEVICE

No Plumber Should Be Without

Send for a Set To-day

"LITTLE JACK" has a bulldog grip, but will not mar nor deface lead or nickel.



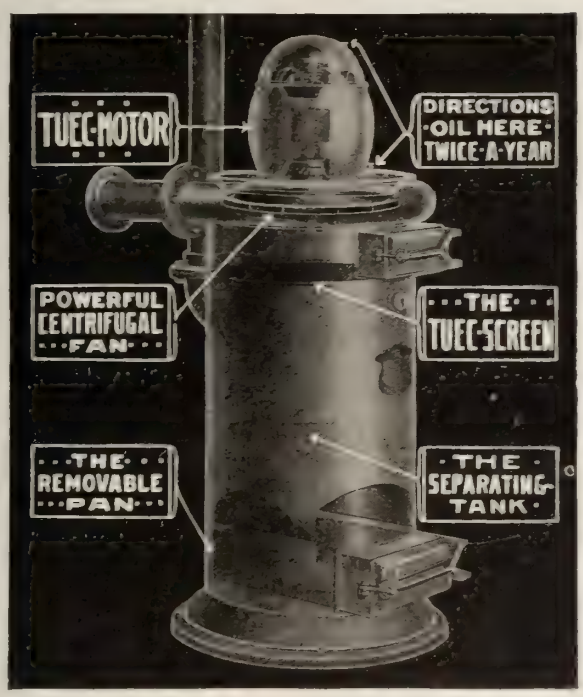
Securing the loose nut of soldering unions, couplings, basin and bath cocks, etc.

Canadian Wolverine Company, Limited

Manufacturers of Plumbers' Tools, Etc.
CHATHAM - ONTARIO

TUEC DURABILITY

READ ABOUT THIS SEVERE TEST



ON Aug. 12, 1915, we had a Number 190 TUEC set in motion at full speed, viz., 3,500 revolutions per minute. The Mayor of Canton sealed the switch, and it has to date remained sealed. Our object for so doing was to put the TUEC to as severe an endurance test as we could, under everyday working conditions.

AT the time of going to press it was "still running," which means that this machine has never stopped for anything since August 12, 1915—396 days—and does not show any indication of being worse for wear. Cool, silent and as good as the day it was set in motion.

DURABILITY AND ENDURANCE TEST.

AS to real durability, this machine has been **on active service equal to 9,504 hours actual use.**

Assuming that a machine is used three hours per day, six days per week, this machine has proved to be no worse for wear after more than ten years' service. **And is still running.**

The circumference of the fan is 45 inches. At 3,500 r.p.m. it has travelled a distance of one million four hundred and seventeen thousand five hundred miles (1,417,500 miles) more than 56½ times round the world at the equator.

No stationary cleaner has ever withstood such a test.

SEND us name of any person you think would be interested in a stationary cleaner and we will assist you to secure **an order** and show you how to install it.

WE SELL TO THE LEGITIMATE TRADE ONLY.

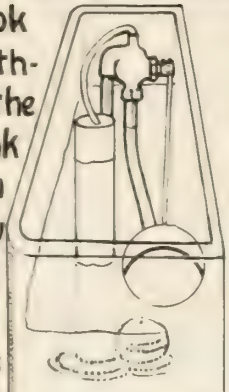
THE UNITED ELECTRIC COMPANY

159 Richmond Street West, Toronto, Ontario

TUEC RECEIVED GRAND PRIZE AT PANAMA-PACIFIC EXPOSITION

Noisy Filling a Nuisance

Look Within the Tank You Buy ::: Get The Best.

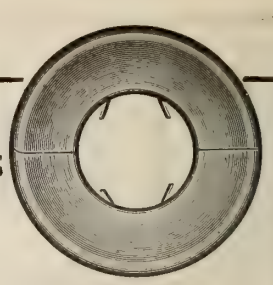


That's Why Leading Tank Manufacturers Jobbers and Plumbers Are Using More and More QUATURN SILENT BALL COCKS! A Fair Test Will Convince YOU of Rapid, SILENT FILLING! Post-Card Brings Prices!

Wallaceburg Brass & Iron Mfg Co. Ltd
Wallaceburg · Ontario.

OPEN VIEW NO. 10-A.

The CEILING PLATE that's better



TOP VIEW NO. 10-A.

THE NO. 10—A NARROW FLANGE PLATE IS A STEEL HINGED PLATE. FLANGES ¾" WIDE. HIGHLY FINISHED. ESPECIALLY DESIGNED FOR TWIN CONNECTION "NARROW."

The split ceiling plate is coming more and more into use than ever and ALWAYS GIVES A NICE FINISH, because it can be attached to mains and risers at the very last, and is not exposed during completion of a building on the floors.

High quality at the right price

Gem No. 4.

Gem No. 4 Automatic Air Valve

Made from the best brass obtainable. Pressed shell and pressed brass base which eliminate danger from blowholes, which is a fault with cast bases.

Write for catalog showing our complete line of specialties.

The BEATON & CADWELL MANUFACTURING Co.

New Britain, Conn.

Eastern Agent: J. R. Devereux & Co., 233 St. James Street, Montreal. Western Agent: A. E. Hinds & Co., Chamber of Commerce, Winnipeg.

For simplicity of construction and thoroughly reliable trouble-free service under all moderate working pressures up to 125 pounds steam or 175 pounds water, gate valve users are recommending

JENKINS BROS'. TYPE "K" GATE VALVES

Fig. 101 Type "K" Iron Body O.S. & Y. Gate Valve Flanged

Standard Pattern

The globe-shaped body insures perfect castings and enables the valves to resist without distortion and leakage the strains of pressure, expansion and contraction, improperly supported piping, and other severe conditions. The iron body valves are made either stationary or rising spindle, screwed, flanged or hub end.

Write for Catalogue No. 8.

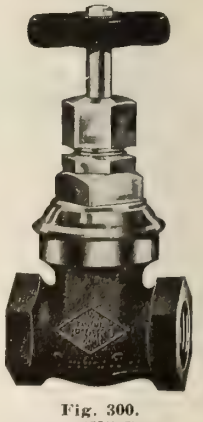


Fig. 300. Type "K" Brass Gate Valve Screwed.

Jenkins Bros., Limited

103 St. Remi St. MONTREAL

OSBORNE HOUSE, ISLE OF WIGHT
FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

ROYAL PALACE OF LA MAGDALENA
SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN

SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

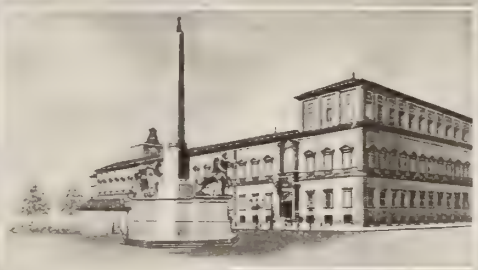
Standard Sanitary Mfg. Co.
Limited

General Offices and Factory: Royce and Lansdowne Aves., Toronto, Ontario

TORONTO STORE
55-59 Richmond Street, West

HAMILTON STORE
20-28 Jackson Street, West

BALMORAL CASTLE
SCOTTISH RESIDENCE OF THE KING AND QUEEN OF ENGLAND



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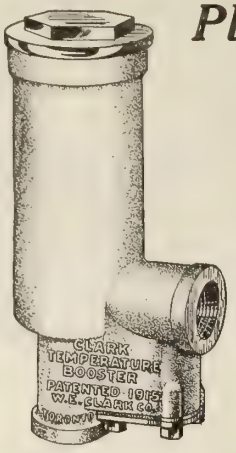

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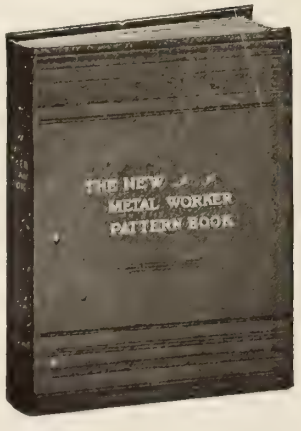

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who complains of his tools, as a general rule. But he's a poorer workman who, knowing his tools are inefficient, does not complain.

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SANITARY ENGINEER

PLUMBER AND STEAMFITTER OF CANADA

Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, SEPTEMBER 15, 1916 No. 18

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EDITORIAL

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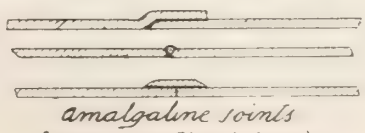

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THE SANITARY ENGINEER

VOL. X. SEPTEMBER 15, 1916 No. 18

A Discussion on Credits and Discounts

Who Do, and Who Do Not Deserve Credit? — Opinions of Various Members of the Trade—A Move to Eliminate Undesirables from the Business or Make Better Business Men.

BY ONE OF US.

Article No. 2.

"I DON'T recall reading any article for some time which interested me as much as did the one which appears in the September 1st issue of The Sanitary Engineer. It is a step in the right direction, and as one of your regular readers, I certainly hope something will be done to improve the conditions under which we sanitary and heating engineers are struggling."

Such was part of a communication which came to hand recently as a result of the article referred to. Another reader expressed his views in the following manner: "It seems to me that if a person knows full well that he will be held liable for all goods he receives, he will become a better business man."

As things are, any "good fellow" appears to get all the stuff he wants, and possibly for a year or two all goes fairly well. Then things begin to look bad, and our "good fellow" ponders in his mind how an improvement can be effected. He is in "a hole" for perhaps a couple of thousand dollars, and thinks that by working a few hours extra every day he can pull through, or he may try and skimp a job. But it is absolutely no good. The best friend to such a man is the jobber or manufacturer who demands that a fresh start be made, the old debts consolidated, an inventory made of his stock and book accounts, and a proper system of bookkeeping put into operation. That is if the game is worth the candle. But while such a procedure may be all right for the man in a small way now, what is going to be done with the new beginners? That's the question.

It just means that every association should get together, call upon the manufacturers as well as jobbers, and see if the giving of credit to irresponsible persons cannot be kept down to a minimum.

Speaking of the system in vogue in Milwaukee, to which reference was made in our last issue, another correspondent says:

"The system in operation in Milwaukee had to have a start just as everything else must, and, admitting that conditions are in need of an improvement, something must be started if matters are ever to be improved.

"If all outstanding accounts were to be put into such shape that they could and would be reduced, then all goods from now on paid for on some predetermined date, there could not help but be an improvement.

"But here is one trouble. We have not reckoned, and are not reckoning with the other fellow. Just to cite an instance. One person buys a bill of goods and he expects to receive payment on a certain date. He relies upon his customer to pay promptly, and undertakes himself to pay a given sum on that or near that date. But his customer does not meet the obligation, and as far as he is concerned his whole business is disorganized temporarily. It is the same old story in every trade, though worse if anything in the sanitary and heating trade."

But there is a light on the horizon; business men who pay their accounts promptly can object to the source of their supply, giving the same benefits and more to the man who does not pay his debts.

There remain but two ways out of the difficulty—that is, by the person who pays his bills promptly demanding a discount worth while; not a mere 2 per cent., but a 10 per cent. or 15 per cent. This will do two things: First, it will eliminate the dead-beat, because the cash buyer can under-quote him out of business; second, it will make those in business attend better to their collections, thus enabling them to join the band of cash buyers.

When I say cash buyers, I mean those who pay their accounts promptly when due.

I remember a good number of years ago in Old England seeing a sign standing on the desk of a number of offices bearing the following words:

"We pay no cash or accounts today. Wednesday is our pay day."

Upon inquiring what that meant, I was informed that on a certain day all money, cheques, etc., were paid; some personally, some by mail, cash or otherwise, and said I: "Do you pay no money out or buy goods which have to be paid for on other days?" No, we only buy on the understanding that the goods will be paid for from week to week. The gentleman who is our manager now has saved his salary time and again. He started a purely financial department, and all accounts are sent in promptly, checked over and certified. The financial department gets credit for all the discounts it can save. We often would buy at 30, 60, or 90 days, because of it being the custom adopted by the seller. But always deducted discounts for cash payments.

Upon further remarking that, if Wednesday is your paying day, Thursday, a.m., finds you owing not a shilling?" "That's the case," was the reply. "We start every Thursday with a clean sheet."

There is certainly something to be proud of in the management of such a concern, and no reason in the world why every sanitary engineer in Canada could not adopt some such system; but no doubt it will take time. It will result that unless he pays attention to collections, as well as paying his first accounts, that his source of supply will be automatically cut off. Such a stand appears harsh, but present methods are causing the whole trade to suffer, just as would a mortified wound on one limb of the body. The limb has to be removed that the life body may be saved.

Montreal Technical School and Its Equipment

In the Brief Space of Some Five Years Since its Establishment, the Montreal Technical School Has Amply Demonstrated its Worth as a Developer of our National, Commercial and Industrial Enterprise—A Recital of th Contributory Factors.

(Continued from Last Issue.)

IT might be stated here that practical lessons on the construction and operation of gas and steam engines are given to engineering students by their class instructors, aided by the engineer of the power house; in addition to which there are numerous models, in section, of feed water pumps, injectors, and many engine room accessories from which the pupils are given personal instruction.

Main Switch Board

The engine room switch board consists of seven panels of polished white Italian marble. The feeder panels from which radiate the various primary circuits contain a Bristol watt-hour meter for recording total station output, and three double pole plain overload circuit breakers. Knife switches, with enclosed fuses on the face of the board, control the lighting feeders. The accumulator panel is equipped with meters, overload breaker, a battery rheostat and an eleven point end cell switch. The generator panels are fitted with Weston flush-type ammeters, with a range of 150 per cent. of generator output; and three-pole knife switches with fuses on the rear of the board.

A voltmeter, located at the extreme left of the main switch board, and supported on a swinging arm, can be made to indicate either the bus bar voltage, the voltage of any machine, or the drop of potential between the bus bars and the ground.

Wood Working Shop

A fully equipped wood working department, with an area of 6,810 square feet supplies ample facilities for [illegible] instruction in carpentry, joinery and pattern-making. The machine equipment comprises eight power wood-turning lathes, four motor driven lathes of variable speed, one each, band saw, circular saw, jig saw, buzz planer, pony planer, mortising machine, tenoning [illegible], drill, shaper, trimmer, auto-[illegible] band saw filing and setting machine, band brazer, and two grindstones; 30 benches, part of which are shown in Fig. 5, are also provided each with two separate sets of tools, one for the day and the other for the night classes.

Foundry

This department has a total area of 5,210 square feet and all the castings

FIG. 8. ELECTRICAL WORKSHOP AND ELECTRO-DYNAMIC LABORATORY.

used in the various workshops are made here by the pupils, with the aid of the instructor. The equipment consists of a 2-ton per hour King cupola, one oil melting furnace, underground installation of compressed air for operating elevator and pneumatic tools and machines, two moulding presses, two core ovens, one core machine, one coning machine, one sand sifter, one sand mill, two snagging wheels, one torch heater and moulding benches for 24 pupils. Two 1-ton traveling chain blocks are used for transferring castings and material.

Forge Department

This section has a total floor space of 5,210 square feet and contains 24 Sturtevant forges, operated by forced blast supplied through underground piping from a 24-inch fan direct connected to a

FIG. 9. VIEW IN MACHINE SHOP.

Sturtevant Co. four horse-power motor. A large 4-foot fan operated by a 9-horse-power electric motor is used to draw the smoke and gases from the fires and exhaust the same through the roof. This equipment is shown in the top background of Fig. 6. An anvil is supplied with each forge, and in addition there is one case hardening and tempering furnace, 30 inches square, supplied by the Buffalo Forge Co., one 170 lbs. steam hammer, made by Vulcan Iron Works, one Plessisville Foundry 75 lbs. spring hammer, one McGregor Gourlay Co. shear, also two swage blocks, two blacksmiths' vises, one tool bench and vise, and a plentiful supply of tools for each fire.

Electrical Section

Directly adjoining the machine shop is the electrical workshop and the electrodynamic laboratory; the former containing one armature banding and heading machine, one notching press, one shear, one pair smoothing rolls and one buffer. In the laboratory are five groups of induction motors, one single-phase synchronous motor coupled to a direct current dynamo; one direct current motor coupled to a three-phase generator; one compound wound generator, one six-change commutator and one direct current motor coupled to an alternator. A large seven-panel switch board, fully equipped for experimental and operating purposes is also provided. There is also a switch board for telephone instruction, and a storage battery having a capacity of 200 ampere-hours.

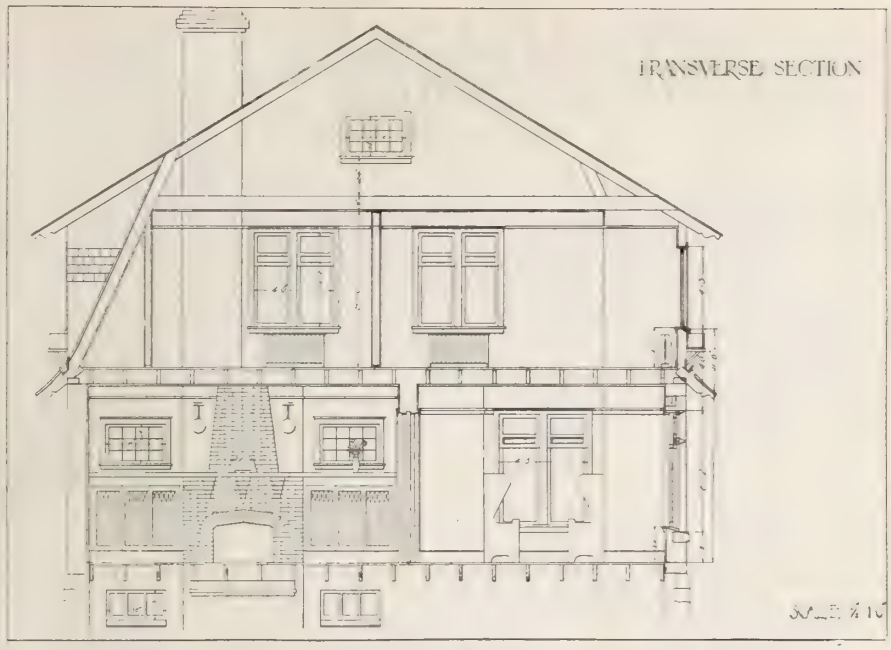


FIG. 10. SUBURBAN HOUSE—WORK OF A THIRD YEAR STUDENT.

FIG. 11. ANOTHER VIEW IN MACHINE SHOP.

Machine Shop

The large and modern machine shop, with a total floor area of 11,340 square feet, offers excellent facilities for thorough and efficient instruction in machine shop and tool room work. As shown in Fig. 9, the shop is of extensive proportions, well lighted and equipped with a large number and variety of modern types of machines. All instructors have had many years of practical experience and are well qualified for their respective positions.

The machine tool equipment is divided into three sections, each section being driven by a 15-horse-power Crocker-Wheeler motor. The machines installed are:

Drills.—One American Tool Works, 3-ft. radial; two 20-in. Rockford; two 16-in. W. F. & J. Barnes; two 16 in. Hoefer; four 12-in. Rego; one 10-in. Freeport; two 10-in. Hamilton Machine Tool Co.; one Washburn drill grinder.

Shapers.—Three 12 in. F. Pratt & Co.; one 16-in. R. A. Kelly.

Planers.—One 2 x 2 x 5 ft., and one 2½ x 2½ x 7 ft. R. Gardener & Sons, Montreal.

Lathes.—Ten 10-in. Seneca Falls speed lathes; two 12-in. Seneca Falls; four Jones & Burton 10-in. gap; one Flather 15-in.; one Springfield 15-in. motor driven; three Fay & Scott 16-in. motor driven; one C. M. C. 18-in.; one Reed 18 in.; one Seneca Falls 14 in.; one Cisco 16 in.; one Von Wyck 18 in.; one Hendey 16-in. special lathe; and one Hare 6-ft. face plate lathe.

Milling machines.—One Brown and Sharpe universal; one Jones & Burton horizontal; one Becker vertical; and one Greenwood & Batley vertical.

Miscellaneous.—Two Whitton centreing machines; two Greenerd arbor presses; one Becker automatic gear cutter; one Binsse horizontal boring mach-

(Continued on page 36.)

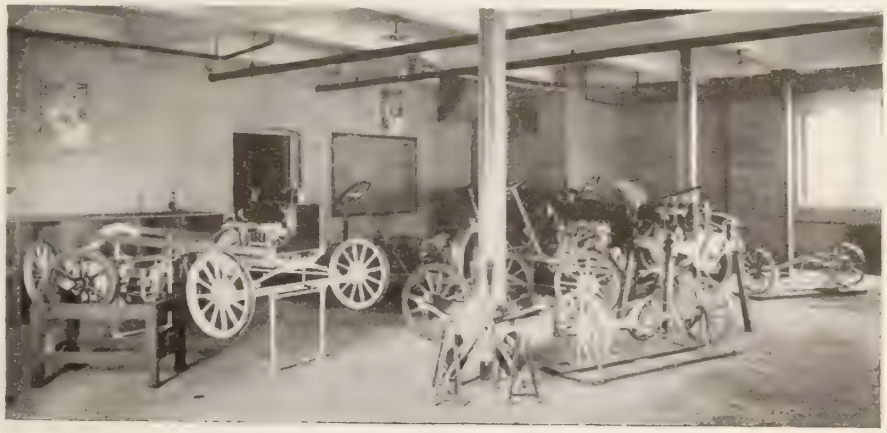


FIG. 12. AUTOMOBILE CHASSIS CONSTRUCTION AND ASSEMBLY.

THE SANITARY ENGINEER

PUBLISHED ON THE FIRST AND FIFTEENTH OF EACH MONTH.

THE MACLEAN PUBLISHING COMPANY, LIMITED
TORONTO, CANADA

Subscription $1.00 Per Year

JOHN BAYNE MACLEAN - - - - - President
J. G. LORRIMAN - - - - - - - - Manager
EDWIN NEWSOME - - - - - - Editor

VOL. X. SEPTEMBER 15, 1916 No. 18

CREDITS AND DISCOUNTS

THE subject under the above heading which was discussed in an article on page 15 in the last issue of THE SANITARY ENGINEER was read with no small amount of interest by our subscribers. Judging from the amount of correspondence we have received from manufacturers, jobbers and sanitary engineers, it would appear that there is a general consensus of opinion favorable to the adoption of some scheme which would remedy the evil referred to and place matters upon a more satisfactory basis for all concerned. It must not be inferred that there is any desire on the part of the manufacturers and jobbers to make use of any scheme which might be so instituted to raise prices unduly or without good and sufficient reason. Their only wish is that fair prices should be fixed and adhered to, and the sanitary engineer of any standing is willing to pay such prices for good value received.

One other point of interest arises in connection with specifications which are sent out with a view to procuring tenders or estimates and that is in regard to certain specified goods or materials. If specified goods are required and used they will bear their price with a fair profit provided always that the person installing same pays for them.

If it were as difficult to procure goods on credit from the jobber or manufacturer as it is to get cash from a banking institution, conditions in the trade would soon begin to show an improvement as far as the fair-dealing and responsible sanitary engineer is concerned. Under existing conditions, however, the amount of money belonging to manufacturers and tied up in outstanding credits is appalling. The actual proportion of this money which may eventually be lost in bad debts may not be very large, but the interest alone which all overdue accounts should really bear, though we fear they seldom or never do, would amount to a considerable sum, to say nothing of the inconvenience and difficulties arising from the non-payment of the accounts as they fall due. In another article which will be found elsewhere in this issue are given some comments which have reached us from various correspondents on this subject.

WHAT IS TRADE PROTECTION?

THE question of trade protection is always and ever will be of great interest to business men, in whatever line of business they are interested. The thing is: what is true honest protection?

A manufacturer makes a certain line, his customers, or shall we say the sanitary and heating engineer does not appear to be putting forth the effort which the manufacturer thinks he should. The manufacturer is therefore forced to call upon the prospective customers of the sanitary engineer and in so doing makes a sale. The question is, in what way should the trade be protected? Let us cite one case which came to our notice just recently. A certain manufacturer from time to time made a number of calls upon a sanitary and heating engineer, later on an inquiry was received from a person in that district in which this sanitary engineer was located, the manufacturer sent the inquiry to Mr. S. E. and thought there would be something doing. Nothing, however, transpired and after seven weeks, the manufacturer again wrote Mr. S. E. asking him if any business has been done with the inquirer.

Two weeks again elapsed and finally the manufacturer took the matter up and made a direct sale.

Later on another sanitary engineer who had had the contract to install the goods, wrote the manufacturer for a commission although he had had nothing to do with their sale, and he claimed that he was entitled to protection. The price charged the customer was the same as would have been charged by him had he made the sale.

The point is that if a sanitary engineer makes a sale, he is of course entitled to a profit. He would also be entitled to a profit if he introduced the buyer to the manufacturer, and when a manufacturer quotes a price with a view of protecting the trade that price should be the sanitary engineer's selling price.

But if a sanitary engineer is so disinterested in an inquiry that he will not attend to the proposition he is entitled to no consideration whatever.

True protection is charging a price which will enable the legitimate trade to make a profit. If a manufacturer has to go out of his course to create business, he is entitled to the extra profit on the sale. The manufacturer does not want to sell direct to the consumer, he wants to manufacture, and let the trade be the distributors. But he must have an outlet for his output and unless the trade wake up and create this outlet, the manufacturer has no other course to pursue than to make an outlet for himself.

DON'T forget that credit received carries its responsibilities.

View of Government Building in Exhibition Grounds, Toronto.

The 1916 Canadian National Exhibition

This Was the 38th Consecutive Year of the National Exhibition, Toronto—The Undertaking Stands Out Far Ahead of Any Other Exhibition Ever Held in Canada, and Symbolized in a Splendid Manner the Idea of Empire Federation.

THAT the 38th Canadian National Exhibition was as great if not a greater success than ever, is now an admitted fact. While the number of visitors did not quite touch the million mark, the home folk were in greater evidence than ever. This, in spite of the war, speaks well for the patriotism of the Canadian people.

If anything the exhibits were more instructive and interesting than in the past, and those persons who visited the various stands appeared to be "taking more in" than in past years. It is just such interest and appreciation as was here shown that not only justifies but makes such enterprises very essential to the Canadian people.

Never was there need for such serious thought as at the present time. We need to know more of what we do and why we do things than ever before, we need to exploit our ideas, and make every action count for something of a productive nature.

Our engineers are taking to heart the need of cutting out all unnecessary motions, thus making every moment count. Twenty-four hours a day is all too short to many. Not that we really need a longer day even it were possible to make it; but rather that we make every moment account for some specific accomplishment.

Such considerations no doubt justify the time and trouble expended over such an event as the National Exhibition.

Looking Back.

In previous years we have as it were looked back in our endeavor to see what progress has been made in the development of sanitary heating and the science allied with this calling.

Transportation Buildings situated in Exhibition ground, Toronto.

Every branch of the trade was ably represented by various concerns.

Sanitary Ware.

The Sanitary ware showed great improvements in both design and finish, cast iron enamelware and solid porcelain. One concern specialized in English vitreous chinaware.

Pneumatic Water Systems.

Pneumatic water systems were on exhibit in the machinery hall as well as in various parts of the Exhibition, and great improvements were specially in evidence. The great strides made in this line reflect great credit upon those who have been actively engaged in the production of these machines, which were the very acme of simplicity, durability and efficiency.

Heating Appliances.

In the heating industry, new types of boilers, magazine and smokeless down draft boilers as well as improvements in grates and sundry fittings which go to make every heating furnace more complete were in evidence.

Applied Arts Building and grounds showing beautifully laid out flower beds.

Exhibition crowd passing rear of Grand Stand.

Gas Section.

The gas appliances on exhibit were amazing, gas water heaters of various kinds, instantaneous storage, automatic, thermostatically controlled and otherwise. Other gas appliances too, were in evidence, such as gas ranges which could be controlled by thermostats; gas heated appliances of an industrial nature to be used in factories and workshops; blow lamps and blast furnaces using gas as fuel; all of which went to prove that the uses to which gas can be put are many and varied.

Metal Exhibits.

All manner of metals were in evidence in various forms, sheets, pipes, tubes and castings of all sorts for use in the sanitary and heating trade.

Vacuum Cleaners.

A number of exhibits were devoted to machines and machinery used to eliminate dust from our homes and buildings. Only one concern had stationary vacuum cleaners on demonstration, but quite a number of portable cleaners were on exhibit.

Sanitary Drinking Fountains.

Every year brings a greater variety of sanitary drinking fountains into existence and this year was no exception. Almost every exhibit of sanitary appliances had one or more of these very necessary fixtures in actual use.

Steam Specialties.

Steam traps for radiators as well as return condensation traps were well represented. Valves, automatic and ordinary, and new styles of check valves for both water and steam, played no small part in many an exhibit, and the higher grade of goods seemed to be the rule rather than the exception. This goes to prove that the public are demanding quality in preference to price.

The tendency to buy higher grade goods is another proof that more thought is being given to the buying end of the business.

Crowd at recent Exhibition held in Toronto.

Robertson's Exhibit Better Than Ever

Firm Making Plans for What They Anticipate to be a Resurrection in the Building Trade Next Spring—Splendid Line and Variety in Evidence — Made-in-Canada Porcelain a Prominent Feature.

IT is quite evident that the James Robertson Co., Limited, are not at all pessimistic concerning the early future of the building trade. There was an air of cheer and activity about their exhibit that was in graceful contrast to what has been the general attitude of the building trades concerning business conditions in the past twelve months.

In addition to showing their full line of really high-grade bathroom equipment, including smaller fixtures, the Company made a special feature of its most moderate priced Showers; displayed a full range of Robertson's Riley fixtures, and devoted particular attention to their Cone return valve.

One learned, upon inquiry, that business in moderate priced showers is increasing. A shower in the bathroom will, it is believed, soon become as common as a wash basin. It certainly is as useful and almost as necessary.

As far as Riley fixtures are concerned, there is no make of faucet in the Canadian market that is as efficient as these are. Their easily removable seat and loose compression disc and extra heavy castings commend themselves most favorably to the practical man.

Many steam fitters had an opportunity to become acquainted with the Cone return valve for the first time and were unquestionably impressed by its demonstrated efficiency as an adjunct to any steam heating plant.

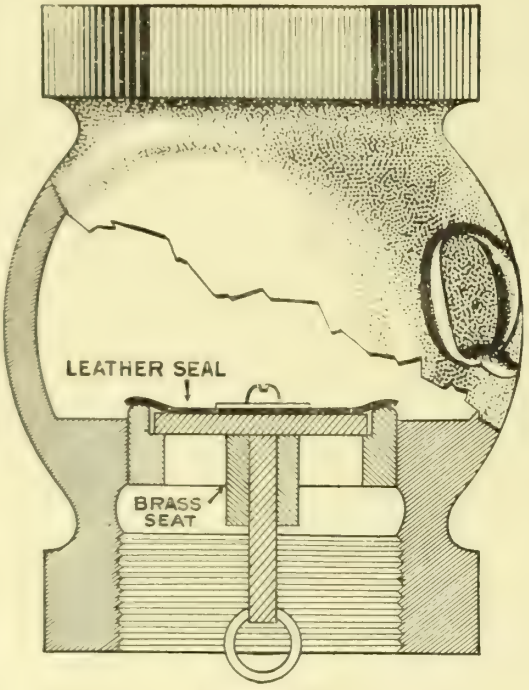
Altogether, the Company was well satisfied with its exhibit and with the interest of the trade in it.

THE JAMES ROBERTSON CO., LIMITED

Did you see our "Q" Valves at the recent Exhibition?

NO MORE LEAKY FOOT VALVES

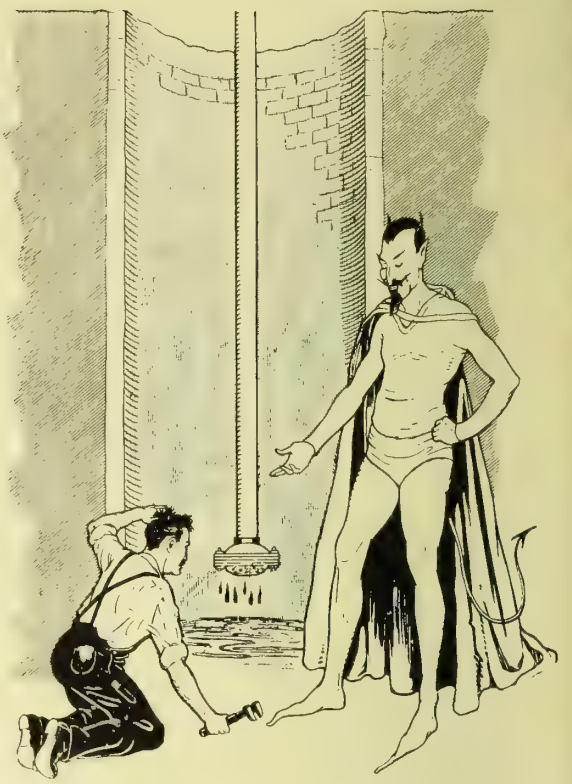
"It Just *Can't* Leak"



Patented 1916

A BRASS, non-corrosive seat, hydraulically pressed into a one-piece iron casting. A thoroughly supported, thin, flexible leather SEAL, —that's all. The cut tells the story.

Guaranteed not to leak a drop.



"And the curse on the plumber was placed in a well."

YOU know the story,—A call over the telephone from miles out in the country: "That darn pump still looses its prime. I'll not pay you another cent on the job till you fix it." A long drive; get down the well; put on another valve. Probably the same result. You lose your prospective profit, your temper and a good customer.

"Q" Foot Valves cost a few cents more, but, Oh! the satisfaction.

We *Make*
Peerless
Water
Systems

Manufactured and controlled by

National Equipment Co., Limited

TORONTO, CANADA

Sold by all jobbers

B.O.T. Manufacturing Co. Exhibit

Those Sanitary Engineers Who Visited the National Exhibition Recently Held in Toronto, Could Not Fail to be Agreeably Pleased and Surprised at the Great and Progressive Strides Made in Tank Construction and Finishes.

THE B. O. T. Manufacturing Co., were certainly in the lead with their exhibit. The invisible lock-dovetailed joint commanded the attention of quite a number of visitors. This joint is very novel and once made simply can not come apart. This progressive company gives a five year guarantee with all their goods, which proves that they can be depended upon.

This concern makes a fine W. C. seat, of straight grain construction, guaranteed not to split. The white finish on the goods is guaranteed not to discolor even with acid. When asked how many styles this firm manufacture, it was a surprise to learn that no less than 42 different varieties are made, all of which bear a **five-year guarantee.**

The beautiful solid vitreous china tanks also came in for a lot of attention.

Another outstanding feature of the B. O. T. tanks is the absolutely fool-proof lever with which each tank is fitted.

The B. O. T. Co. have also acquired the privilege of handling the Mueller brass line of Sarnia, and will handle this line exclusively, so that when their patrons order brass goods they can rest assured that they will receive the Mueller line and no substitute.

The exhibit as a whole reflected great credit upon the management as did also the goods themselves, and judging by the large number of visitors and members of the trade who viewed same, the display was thoroughly appreciated.

B. O. T. MANUFACTURING CO., LIMITED

159 WEST RICHMOND ST., TORONTO

A Circle That Never Stops Growing

IT is astounding how quickly country residents get to know about a water system and especially about the men who build it.

—o—

People are not buying PEERLESS Water systems because they want a water system of some sort, or any sort. They are buying them because they know that the people behind them are producing the precise and particular kind of apparatus they require, and that the product is the result of intelligent study and specialization.

—o—

All over Canada, people are forming a shrewd and accurate idea of the kind of manufacturers The National Equipment Company are.

—o—

They seem to know that the central idea of the Company is that if PEERLESS Water Systems are built right, nothing else matters much.

—o—

People now generally know (either from their own experience or that of others), the good and bad points of different systems and the *character of the service given by their manufacturers.*

—o—

They know WHY they want a PEERLESS System, and they are more eager for it to-day all over the country than they have been at any other period of its history.

—o—

Its production has for a long time been too small to satisfy the demand.

—o—

The explanation is ridiculously simple.

—o—

The system has never bred anything but good-will.

Every time one of these systems goes into a home it becomes an intimate part of the family life of that home.

—o—

It gets nothing but good words, and the whole household becomes a circle of good-will revolving around their PEERLESS Water System.

—o—

The circle spreads, and takes in a near-by neighbor. That neighbor's home, in turn, begins to radiate good-will; and thus the circle grows.

—o—

In that way it has kept on growing wider and wider until it has taken in the entire country.

—o—

The people recognize it as their own. They know it is manufactured in the only plant devoted to the production of pneumatic water systems in the British Empire.

—o—

They know that we build our own pumps, our own tanks, our own electric Control Systems. In short, that we manufacture what we sell; that we understand our business, and stand behind our goods.

—o—

That is why the good-will circle goes on growing greater and greater.

—o—

National Equipment Company know this.

—o—

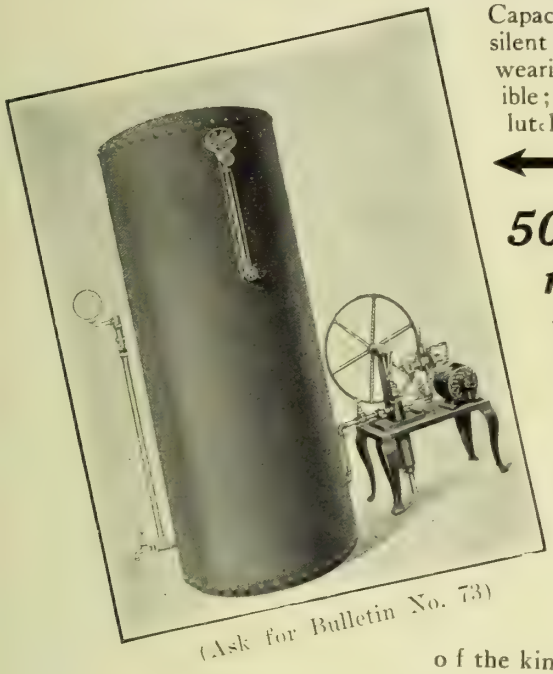
They know it is the greatest asset in their business. And knowing it, they will, of course, keep on making PEERLESS Water Systems better and better

National Equipment Co., Limited

TORONTO - ONTARIO

Did You See Our Goods at the Recent Exhibition?

300 Series Domestic Unit

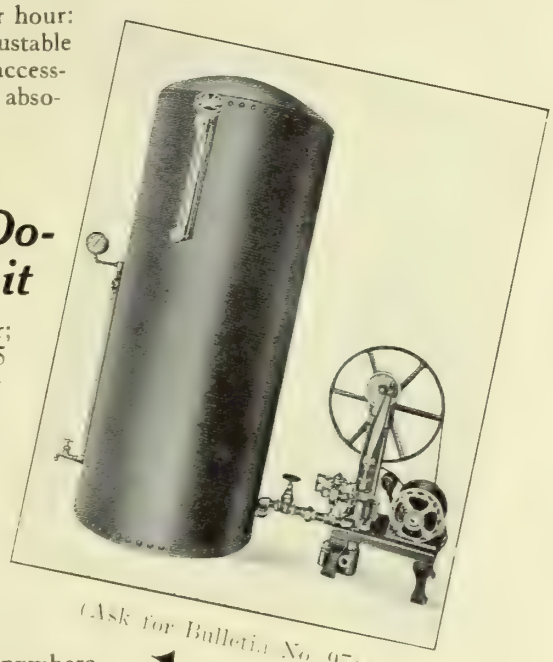


(Ask for Bulletin No. 73)

Capacity 125 gallons per hour: silent; ball bearing, adjustable wearing parts; all parts accessible; Century Motor; absolutely reliable.

500 Series Domestic Unit

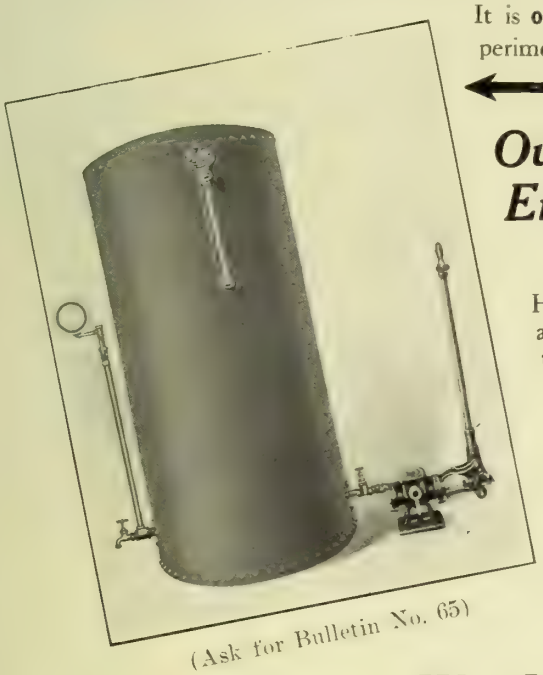
250 gallons per hour; (deep wells 30 to 75 feet, 125 gallons per hour;) surpasses in type of construction, quality of workmanship, quietness, accessibility and appearance, anything of the kind ever attempted anywhere.



(Ask for Bulletin No. 97)

112 Series Domestic Unit

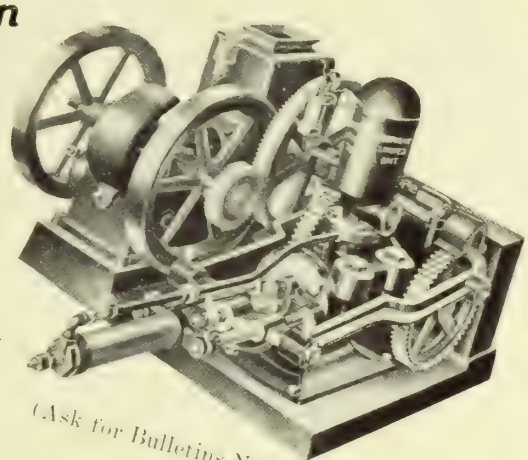
Equipped with new No. 016 hand pump, having a full set of patented "Q" Valves. We are proud of it. It is **original,** and complete. If you have not used one yet, try the experiment. You will be glad.



(Ask for Bulletin No. 65)

Our Direct Connected Gasoline Engine Driven Units

Have long been the accepted standard in this country. Ready to run when uncrated. No wiring to do. Just a drop of gasoline and a turn of the crank.



(Ask for Bulletins No. 84 and No. 94)

We Manufacture

Our own Tanks—Our own Pumps—Our own Electric Controlling Apparatus

In short, we manufacture Hydro Pneumatic Water Supply Systems,—a statement that cannot truthfully be made concerning any other firm in the whole British Empire.

National Equipment Co., Limited

TORONTO, ONT.

Dominion Radiator Co. Exhibit

The Interest Taken in the Above Exhibit Was More Than Ordinary — Sanitary and Heating Engineers Were Given the Opportunity of Making Themselves Thoroughly Acquainted With the Very Latest Line of Heating Boilers, the New Magazine Boiler in Particular.

W[illegible] many architects, engineers and steamfitters who called to [illegible] They [illegible] of gratifying.

We [illegible] the [illegible] the full line of our Triumph-Mogul water and [illegible] Both systems they are neat in design and in operation powerful and economical.

Our well known Mogul hot water boiler received much favorable comment.

For our magazine self-feed down draft boiler we took many orders. "It sure is a world beater" was the general comment.

Our new method of naming radiation appealed to every one and our Saxon-Victoria Regina lines, exhibited in full for the first time, received high commendation.

THE DOMINION RADIATOR CO., LIMITED

The New No. 016 Peerless Hand Pump

(Patented)

Look at the Cuts

They Tell a Story of a New Departure

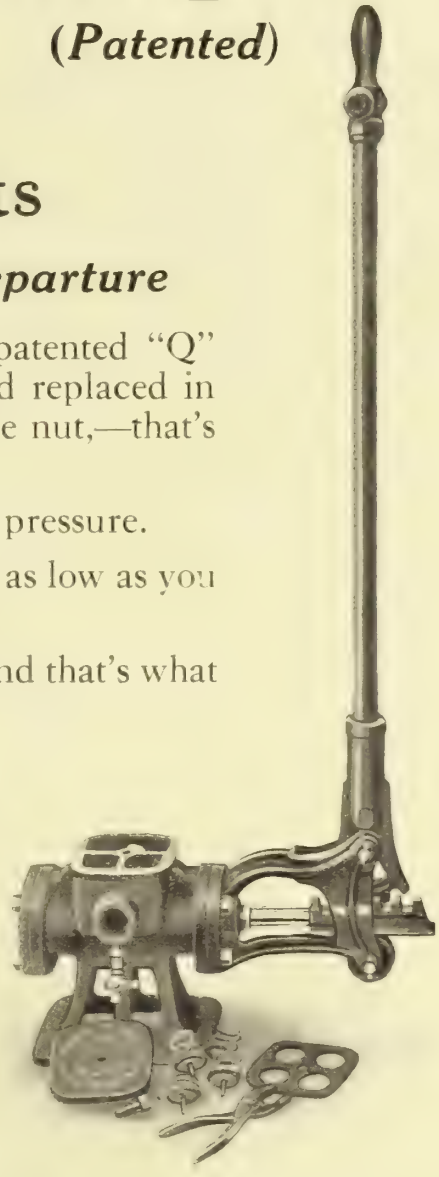
—no copying here,—the Valves are of the patented "Q" type. All four of them can be removed and replaced in twenty seconds,—a pair of pliers to loosen one nut,—that's all.

An eight-year-old boy can pump fifty pounds pressure.

The design is new, and it's right. The price is as low as you have to pay for an ordinary pump.

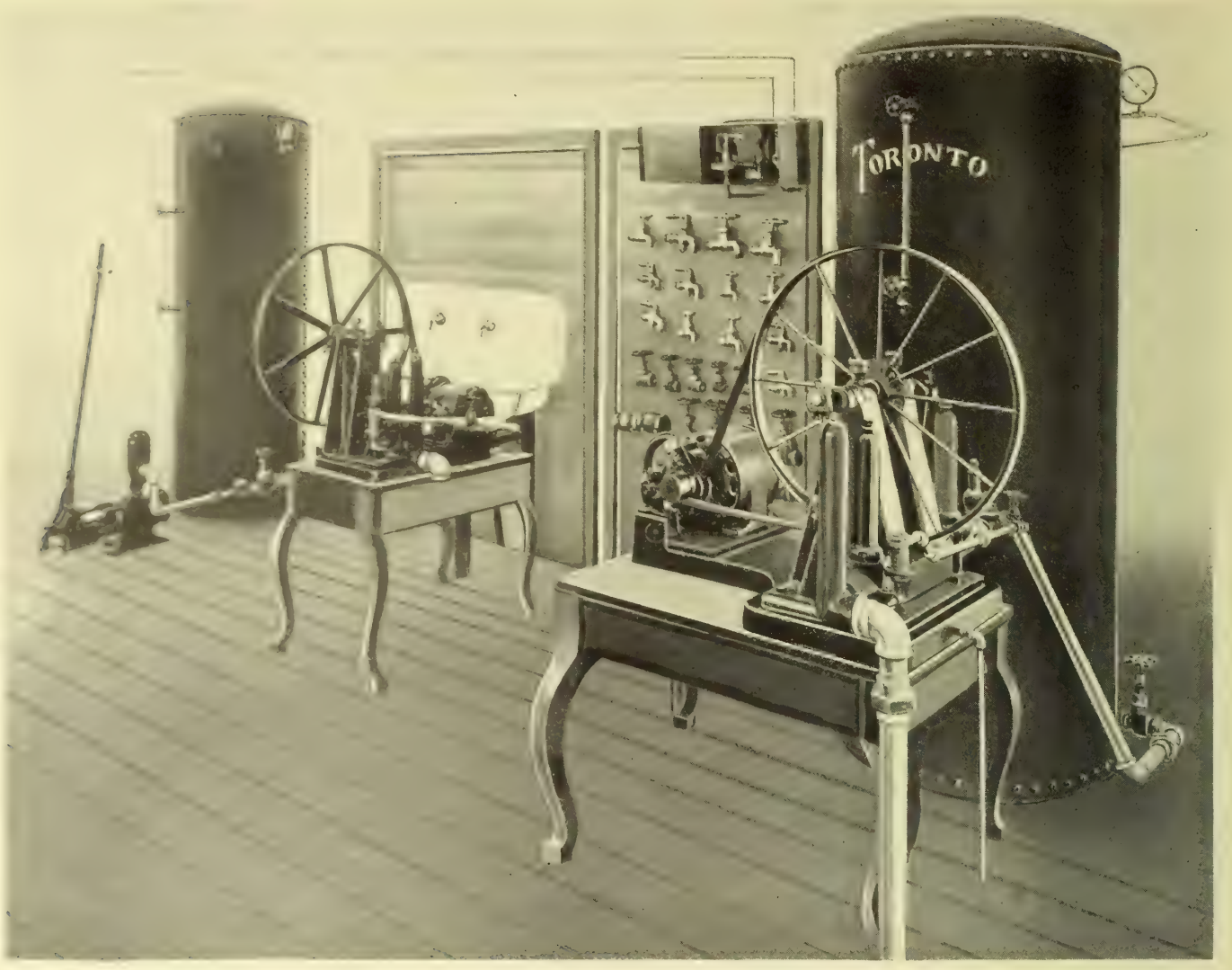
The ease of its operation will astonish you,—and that's what gets you customers.

(Ask for bulletin No. 65.)



National Equipment Co., Limited

Toronto - - Ontario



Ontario Wind Engine & Pump Co.

Every Sanitary Engineer is Interested in Pneumatic Water Systems, and Particularly Those Who Saw the Above Exhibit, Which Was in Actual Operation.

THE [illegible] of the Ontario Wind Engine & Pump Co. present particularly interesting to plumbers who are going after the [illegible] trade. In addition to the single and double electric driven and the hand operated pneumatic systems shown in the illustration, the [illegible] manufacture a full line of gasoline engines and pumps of all kinds. These are all designed particularly to meet country trade conditions and the full line shown includes outfits which will fill any requirements. Country trade is a branch of the water service and plumbing business of Ontario that no plumber can afford to overlook. As the pneumatic principle of water supply is now recognized as thoroughly practical and satisfactory, it is the coming thing. The progressive plumber should appreciate its satisfactory position in connection with this business. The average farmer with a pipe wrench could instal a low pressure gravity water system but the installation of a high pressure pneumatic system requires the skill of an experienced fitter. The installation of a pneumatic system will lead directly to the installation of a complete bathroom and heating equipment and greatly increased business will result.

The Ontario Wind Engine & Pump Co. cater particularly to the country plumbing trade but will be glad to co-operate in any proposition which pertains to any size or kind of pneumatic water service system for either city or country homes or for hotels, institutions or country clubs.

ONTARIO WIND ENGINE & PUMP CO., LIMITED

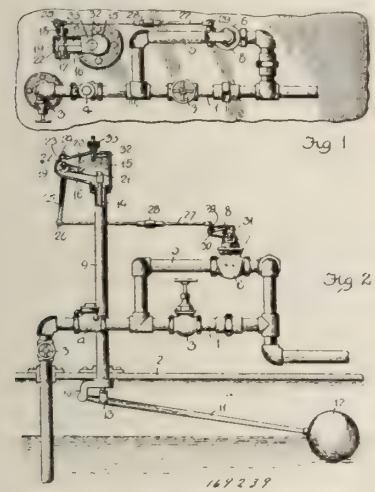
TORONTO, ONTARIO

New Canadian Patents

No. 169,239.

Michael Owen, Detroit, Mich., U.S.A., 2nd May, 1916; 6 years. Filed 25th February, 1916. Receipt No. 262,009.

Claim.—1. In a feed water regulator for boilers, the combination with a water supply pipe provided with a ball valve adapted to control the supply of water to a boiler, of a bonnet of said valve, a crank shaft journalling in the



169,239. Feed Water Regulator

bonnet and having a crank on the outer end of said shaft, a hollow upright adapted for communication with the boiler, a casing at the upper end of said shaft, a hollow upright adapted for communication with the boiler, a casing at the upper end of said upright, a reach rod extending through said hollow upright, a rock shaft supported by said casing and adapted by said rock shaft adapted to move the last-mentioned crank to close the ball valve of said water supply pipe, and means at the lower end of said upright adapted to automatically move said reach rod.

2. In a feed water regulator, the combination with a boiler, a water supply pipe therefor, and a ball valve for controlling the supply of water to said boiler, of an upright in communication with said boiler, an angle bracket on the lower end of said upright against the inner side of said boiler, a casing carried by the upper end of said upright, a rock shaft supported by said casing, means actuated by a movement of said rock shaft adapted to close said valve, a reach rod extending through said upright for imparting movement to said rock shaft, and a float arm carried by said angle bracket above the water in said boiler and adapted to raise and lower said reach rod.

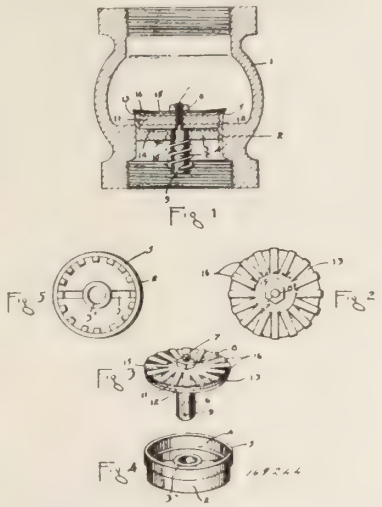
No. 169,244.

Martin Joseph Quinn, Toronto, Ontario, Canada, 2nd May, 1916; 6 years. Filed 17th November, 1915. Receipt No. 258.083.

Claim.—1. In a valve of the class described, a valve seat having annular flanges forming the upper valve seat, such flange projecting beyond the main upper surface of the valve head, and a projecting flexible washer.

2. In a valve, the combination with an angular valve seat, of a flexible washer having its outer edge portion bearing against the upper edge of the valve seat, means for supporting the central portion of the washer, and resilient means held on and projecting beyond the central portion for pressing the outer edge of the washer against its seat.

3. In a valve, the combination with a valve seat having an upper and lower seating surface, of a valve head co-acting with the lower seat, a flexible washer carried by the head and having its outer edge portion bearing against the upper valve seat, resilient means for holding such outer edge portion against its seat, and a washer carried against



No. 169,244. Foot and Check Valve.

the lower face of the head and bearing against the lower valve seat.

4. In a valve, the combination with a valve seat having an upper seating surface and a lower seating surface having notches extending vertically through the seat, of a valve head co-acting with the lower seat, a flexible washer carried by the head, and having its outer edge portion bearing against the upper valve seat, and resilient means for holding such outer edge.

5. In a device of the class described, a valve head comprising a body portion, a flexible washer extending radially beyond the body portion, and spring fingers carried by the body portion bearing against the upper face of the outer edge portion of the washer.

6. In a valve, the combination with the valve seat having an upper and lower seating surface, of a valve head co-acting with the lower seat, and having its upper face located below the face of the upper seat, a flexible washer secured to the upper face of the head and extending radially beyond the outer periphery thereof, the extended end resting upon the upper face of the upper valve seat.

7. In a valve, the combination with the valve seat having an upper and lower seating surface, of a valve head co-acting with the lower seat, and having its upper face located below the face of the upper seat, a flexible washer secured to the upper face of the head and extending radially beyond the outer periphery thereof, the extended end resting upon the upper face of the valve seat, and spring means bearing upon the top of such extended end at independent points.

No. 169,420.

Frank F. Turner, Little Falls, Minnesota, U.S.A., 9th May, 1916; 6 years. Filed 3rd January, 1916. Receipt No. 259,525.

Claim.—1. In a hot water furnace, in combination, a vertical tier of water chambers of inverted U-shaped form arranged in superposed relation, the spaced top walls of said chambers providing a series of flues for the passage of the products of combustion, said top walls being cut away at the relatively opposite ends of the adjacent flues to afford communication between the same, the furnace being provided with a rear vertical outlet flue for the products of combustion in communication with the firebox, the uppermost flue between the adjacent water chambers also communicating with said outlet flue, water legs connecting the adjacent chambers, an outlet pipe connected to the uppermost chamber, return pipes connected to the opposite sides of the lowermost water chamber, and means for causing the products of combustion to pass directly from the firebox into the flue or to travel alternately in opposite directions through the flues between the water chambers.

2.—In a hot air furnace, a base pro-

(Continued on page 42.)

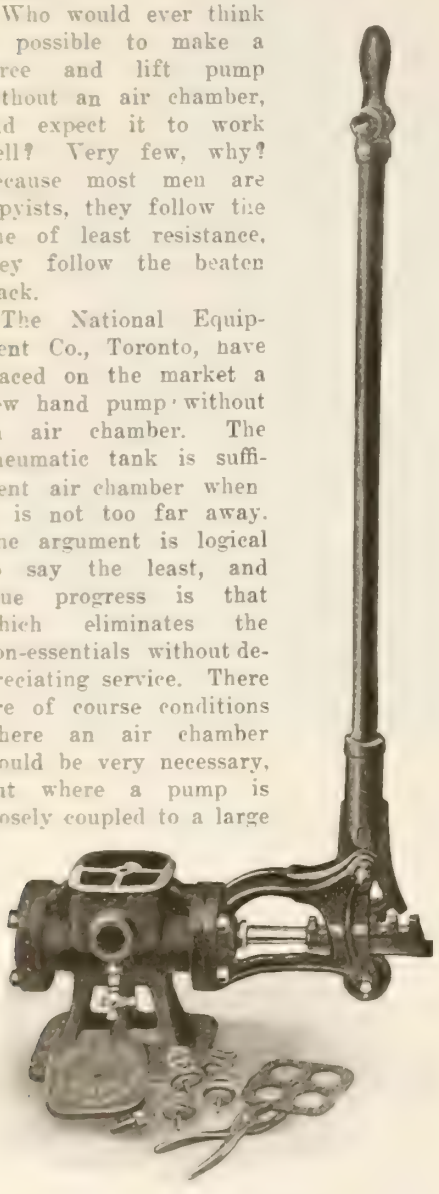
New Sanitary and Heating Goods

A NEW PUMP.

It is a recognized fact that most progress of any note has been made by men who have turned from the beaten track.

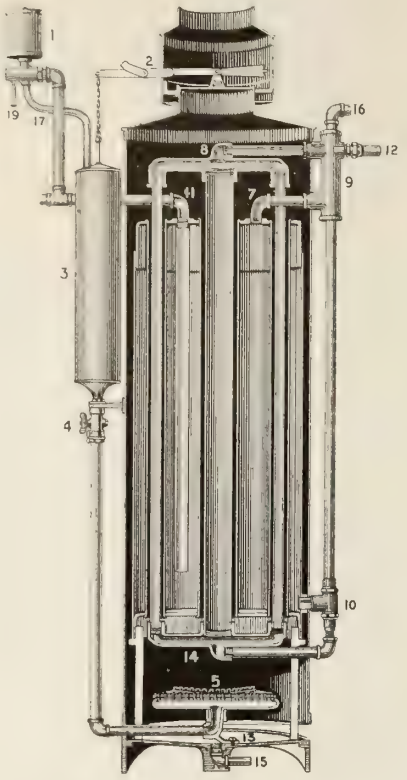
Who would ever think it possible to make a force and lift pump without an air chamber, and expect it to work well? Very few, why? Because most men are copyists, they follow the line of least resistance, they follow the beaten track.

The National Equipment Co., Toronto, have placed on the market a new hand pump without an air chamber. The pneumatic tank is sufficient air chamber when it is not too far away. The argument is logical to say the least, and true progress is that which eliminates the non-essentials without depreciating service. There are of course conditions where an air chamber would be very necessary, but where a pump is closely coupled to a large



or even small vessel wherever air is being compressed, an air chamber is

Those who have installed or constructed soda water pumping plants are only too well aware that air chambers are not a part of such pumps, simply because the cylinder into which the water and CO^2 is compressed answers the purpose of the air chamber. The above illustration shows this new pump with cover and valves removed, further information may be procured upon writing to the above address.



New Allman Gas Water Heater.

A NEW GAS WATER HEATER.

Another step has been made in the perfecting of gas water heating appliances with the introduction to the trade of the Allman automatic gas water heater.

This heater is substantially different in design to any other line previously introduced to the trade.

A pilot light, consuming about 1¼ feet of gas per hour, is designed so as to keep a 20-gallon supply of water always on hand at 100 degrees Fahr., which not only means that that amount of water is always on hand, but also that when the gas is turned on the water has only got to increase the temperature from 100 degrees to a greater heat, in place of having to heat up water from a much lower temperature. This operation only is bound to save time.

The burner is cast in one piece and fitted with lava tips, gauged to burn 84 feet of gas per hour. By employing the luminous flame, and thus dispensing with the Bunsen burner, all danger of poisoning through the burner back lighting is eliminated.

Operating the heater is simplicity itself, simply hold the lever of the control valve until the glass fills with water. That is all you are required to do. Now the automatic part comes into play. The flue damper will open and the gas valve will open and remain open for the desired length of time at which the timeing arrangement is set (usually eight minutes). At the end of this time the gas will be cut off by the gas valve and the damper in the flue will close, leaving the pilot light to continue its work of keeping the water up to 100° Fah. Hence there is no danger of forgetting to turn the gas off and no waste of gas, as in heaters controlled by thermostat which burn day and night to keep the water to the required temperature.

The automatic control valve can be fitted wherever desired in the house and as many to one heater as may be found necessary without one control in any way acting contrary to the other.

Further particulars about this heater may be procured from the Jas. Morrison Brass Mfg. Co., Adelaide W., Toronto.

HOW TO BUILD UP FURNACE EFFICIENCY.

Above is the title of a book written and published by Jos. W. Hays, Rogers Park, Chicago. Its tenth edition being dated April 1st, 1916.

It would be difficult to find a more uninteresting subject to discuss than that of "Combustion" that is when discussed by the average scientific expert. But the way Mr. Hays handles the question certainly is splendid. He has put more of the human element into the book, thus commanding the interest of the average reader.

NEW CATALOGUE

The Canadian Brass Co., Galt, have issued a splendid catalogue recently which describes their line of high grade brass goods in a splendid manner.

It is a very handy size 6 x 9, contains over 120 pages of high grade coated paper. The illustrations are well gotten up, and ably describe the line of goods manufactured by this concern.

A postcard will procure one of the catalogues.

A WISE ARBITRATOR

The father of two sons died, leaving an estate to be divided equally between them. Neither could agree upon which portion each should be allotted.

Finally they did, however, agree upon appointing a certain man as arbitrator, and, furthermore, they agreed to abide by his decision.

This was how matters were settled. Said he: "Well, now, I will suggest that the eldest of you divide the estate and the younger one have the first choice." Needless to say a settlement was effected which pleased all concerned.

NEW HOUSE HEATING APPLIANCE

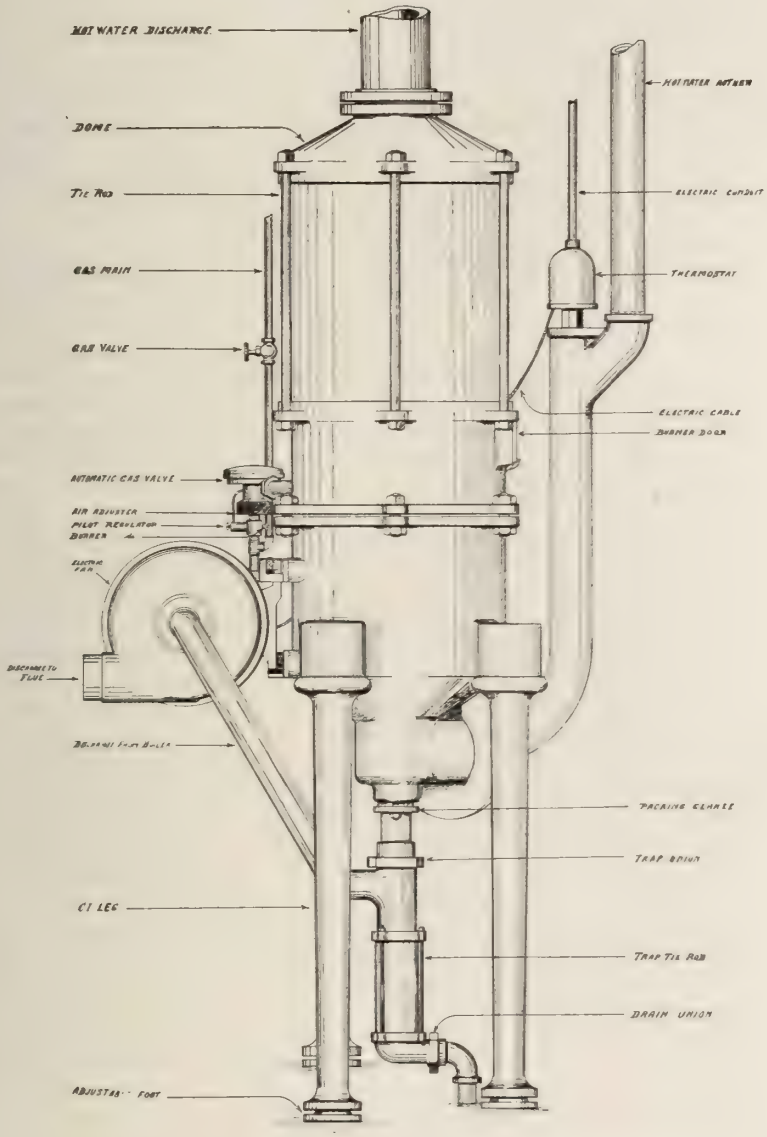
Every day brings its measure of progress. In almost every line there is no standing still, even by our mistakes we progress.

The heating of buildings with gas as fuel has long been an accomplished fact, but almost in every case where coal was anywhere reasonable, and gas plentiful, coal seems to have held sway.

However, by the introduction of specially constructed gas heating appliances, coal as fuel is very likely to lose its prestige.

A new invention which underwent some very severe tests during last winter, has been designed by H. Dodd, who for a number of years conducted tests of various kinds in an endeavor to construct a house heating system, using gas as a fuel, and has now reached a very satisfactory stage.

It consists of an outer casing, with internal water and gas tubes made of the best puddled iron. Has a floating head, holds about 17 gallons of water. The gas and air is burned under about a 5-inch vacuum, this being maintained by a small electrically operated fan which requires a motor of about 1-10 horse-power. This motor is controlled by a thermostatically operated switch.



A new gas fuel furnace for hot water heating systems.

The appliance will, it is said, be made up in one size only, which size will take care of a cubic content of 18,000 feet.

These units are simply duplicated by coupling more of them together, according to the amount of heating surface required.

The inventor claims that a saving of upwards of 20 per cent. in gas and electric currents can be effected where coal can be procured at $8 per ton.

Further particulars may be procured from H. Dodd, the inventor, care Toronto Laundry Machinery Co., Dundas street bridge, Toronto.

THE DANGERS OF DUST

A medical man says that half the food of London is exposed in the road, and if the streets are to go unwatered we shall not have long to wait for "results." Dust, he says, carries the germs of a thousand diseases. It carries, for example, the tubercle expectorated by the consumptive. It carries, also, filth in the shape of manure particles and pieces of grit which are an excellent preparation for many a disease once they are lodged in the mouth and nose. Sanitary engineers can do more than any other craft to eliminate dust at least from the homes, offices and factory buildings.

VALUE OF TECHNICAL PERIODICALS

By A. L. Haas*

There is no man, whatever his position, who does not lose ground unless he reads at least one technical periodical to keep himself informed in regard to new ideas and practice. As a supplement to a restricted field, it possesses a value not to be lightly disregarded.

Access to every text-book printed or to an ideal reference library does not substitute or do away with the necessity for a live technical periodical. The mental effort needed to swallow large treatises is considerable, and it may be said that in most instances they are shelved for reference purposes. If the information contained came in monthly "doses" the effort needed to digest the contents would be considerably lessoned. This does not in the least belittle the field an authoritative book serves, but the serial aspect of a technical journal gives it a great advantage as a purveyor of knowledge.

The man who reads a live technical journal regularly, is less provincial and has broader views and a wider mental horizon than one who does not. He supplements his restricted field or specialized task by fuller comprehension. Even casual reading of matter not directly or remotely bearing upon the reader's work stimulates his faculties and helps to broaden the particular corner in which he is confined, making him feel the brotherhood of craft. This indirect benefit is probably even greater than a direct solution of a reader's difficulty. The bond created between a good technical journal and its readers is of a particularly intimate nature, and is dependent upon both paper and reader. It is a mutual service that is rendered, the dependence of the paper upon its readers consisting in the information and help afforded by the passing along of experience

*London, England.

Farmers in Want of City Conveniences

Country Youths Flock to Congested Cities — Dominion Government Sees Breakers Ahead—Only Two Farm Homes Out of Every Hundred Have Sanitary Bath Room and Water Systems.

TO take a trip into the country and interview a farmer who has equipped his home and other farm buildings with sanitary appliances, then make a call on a farmer who has no such conveniences at his serivce, is the most convincing argument of all that farmers do really need all the comforts which city conveniences will render him.

At the present time farm help is scarce, in fact, it cannot be procured at any price, and thousands of farmers all over the country state that it is not harvesting help they want particularly, but all year round assistance.

The farmer's wife if she be at all practical requires help too, she has to feed the hired farm hands, cook, wash, bake, make butter and help to a large extent with the dairy production.

Can one imagine any thing of greater assistance to her than a good supply of water, hot and cold, together with a bath and proper sewage disposal. With these conveniences the farm household can be catered for with at least one-half the amount of "woman power."

Do we sanitary and heating engineers realize this? Do we see the good we can accomplish by straining every nerve to help the mothers of the rising generation of farmers? It is the farmers who feed us, the city dwellers, the artisan, the makers of things, and if the mother is assisted, if her work is made a pleasure, then her babies are very apt to love their labor when they grow up, because she was contented and interested in her work.

But what can we expect of the offspring of a mother who is nothing better than a drudge, a being who has every possible inconvenience to contend with, [illegible] no wash basin, no laundry tub, bath, etc.

The question of furnishing the above appliances is one of national importance, and it is to be hoped that at no future date a [illegible] will be in operation which will demand that all homes be fitted up with those conveniences which do more to make a residence fit for human habitation than anything else.

A city home without proper sanitary appliances properly installed is not tolerated. Such homes are discarded "Insanitary," "unfit for human habitation," etc. etc. Yet it cannot be deemed that many a farm home is just as unfit and all through no fault of the farmer, but rather on account of lack of education on his part, on the one hand, and because we sanitary and heating engineers have not catered to the farmer and rural resident to the extent which we should have done.

We do hear of a few here and there who are making a specialty of country work, and we find they are doing well, they are building up a nice business and establishing a connection which could not be done in a city.

Just recently the writer interviewed a sanitary and heating engineer who has in less than two years sold and installed 48 pneumatic water systems for country homes. The majority of these homes are now fitted up with a bathroom, hot and cold water and small sewage system. This same sanitary engineer succeeded in putting in a nice order from the local school board in that vicinity for an up-to-date system in a country school.

At first a large warm air furnace and dry earth closets were planned, but this "live wire' at once canvassed several members of the school board, painted a number of pictures in "their mind's eye," recalled several schools which had been equipped in a poor manner just a few years ago, and then in turn asked if the country youngster has not the same rights as the city school children, then finally drove home the bolt by giving an approximate estimate for a first-class sanitary heating, ventilating and sewage disposal system, which led to the board deciding to have the very best equipment installed.

Children raised in the fresh, pure air of the country, in homes properly equipped with all those conveniences which are found in a city home will never be lured to a noisy, murky, dust-laden city. Why should they? And there is no question as to which child, the city bred or country child, will become the most robust, providing we furnish the country child with those things which our calling and science has put it into our power to furnish.

The reader may say that the cost of these things is too high for the average farmer. Such a statement is not an actual fact. The sum of money necessary for a bathroom outfit and water supply, etc., may look high, but the question of health is at stake, the question of labor saving, of increased efficiency must be brought into play when canvassing a farmer.

Last week the writer spent a day or two with a farmer who has a bathroom, hot and cold water and a shower in his home, and when asked if he would dispense with the outfit for the sake of receiving his money back which he had invested along with compound interest, declared that he would never consider the proposition.

This farmer has a windmill and well which furnished water to a pneumatic tank, and until recently he found the windmill answered his purpose for power. But of late the trees around have grown to such a height that they interfered with the air currents, thus reducing the wind power of his mill. He is now about to install a gasoline engine for auxiliary power.

The writer took up the question of "the handy man and wrench job" referred to and in fact advocated by a writer in the Toronto Globe, and this farmer recalled having heard of the article and said: "It is rank nonsense to ever attempt to instal plumbing oneself.

"I myself have done considerable pipe work and have a good idea how plumbing should be installed, but I would never think of installing my own plumbing. I got a first-class plumber to do my work and while at the time I thought the installation cost too much, neither I nor any member of the household have ever regretted the cost."

The commission of conservation have published some very interesting information re sanitation on the farm, and have also shown very conclusively that the average farmer can afford to have sanitary appliances in his home.

The accompanying article which appears in a panel is reprinted from a report published by the commission; and without doubt some very astounding facts are furnished us. Facts that no sanitary and heating engineer can honestly gainsay. Out of 400 farmers we are told that only a little more than 2 per cent. have complete sanitary equipments installed in their home. There are only 7 per cent. or so who have furnaces in spite of the fact that nearly 87 per cent. own their own farms.

Just imagine a person who owns his home not being able to pay for sanitary equipment?

Just imagine that two to one of these who have a bathroom, own an automobile.

What is there in an automobile in comparison with sanitary equipment? The man who sells an auto to a farmer would be a very desirable person to sell plumbing goods. He would not be long in convincing the farmer which of the two would be the best investment. Such being the case there is no reason in the world why we should not take this problem up more seriously and become more successful in our business as salesmen, and, at the same time be giving an invaluable service to the farmer, his household and our country.

The automobile no doubt is a splendid thing to have on a farm, if one can honestly afford it. But what are the chief reasons which induced those farmers who own automobiles ever to have purchased them in the first instance? The principal reason was no doubt a desire on the part of the farmer and family to get away from his home and get away quickly.

The writer knows of one farmer out West who became so taken up with his car that he neglected his farm. Another farmer's wife well known to the writer prevailed upon her husband to "buy a car," and while visiting the writer's home in the city, the question quite naturally turned to sanitary equipment. bath room, etc., and it was surprising to learn that these people had no idea that city comforts could be procured on the farm for little more than the cost of a low-priced car. In fact, this very farmer disposed of his car and bought a furnace, bath-room and kitchen outfit of sanitary appliances.

In soliciting business of this kind from a farmer, the picture of a home equipped in a modern style must first be painted in one's mind's eye. "Show the goods," as it were doing service, a fine warm bath for the tired farmer fresh from the field, lots of hot water for the simple turning on of the tap in the kitchen. No disagreeable privy odors to annoy one, no cleaning out at different times, no going out to such a place on the cold winter days, and no risk of having the drinking water polluted.

In an article published in the Ottawa Valley Journal recently, Dr. J. Clarke, an authority on typhoid fever, said:

"The country privy is exceedingly insanitary, poorly situated, too cheaply constructed, and without proper protection from flies, rats, mice, and farm animals. Not infrequently is the outhouse so situated that the seepage cannot escape going into the water supply of the home. Experiments have proven that this drainage will pass through the earth for a long distance, and wherever this water will go the germs will pass also.

"If a fly should come direct from an open privy vault to the dining table, its soiled feet could not but infect the food. The feet of a fly are large, as compared to the size of a typhoid germ. If you would magnify the germ of typhoid to six hundred times, it would be just large enough to see, or about as large as the period at the end of this sentence. Thousands of these germs could easily adhere to the foot of a house fly, and this is a most likely way for the disease to be carried about, in view of the open privy vaults in the country.

"Another likely source of infection is the household water supply. In the country, when the well or spring becomes infected, it is a more serious matter than the fly-infected food, since everyone drinking the water is taking the infection into the body. Aside from this danger from drinking the water, there is a probability of spreading the disease by the washing of milk pails, vegetables; in fact, everything washed with such water would become a menace. And, of course, the more washing there was done, the greater would be the danger."

One of the finest movements which the Government could set on foot would be to demand that every farm or rural home be equipped with every convenience required in the make-up of a city home. That would be real progress.

Comforts of City Home Draw Youths

Commission of Conservation Considered Farm Problem—Improvements Needed—Solution of National Question Rests in Beautifying Rural Home.

At the last annual meeting of the commission of conservation a report of a survey conducted on 400 farms during 1915 was presented. Some interesting data were secured respecting conditions in many rural homes.

Keeping the young people on the farm is one of Canada's national problems. Many causes have been suggested for the yearning for the city. The convenience of the city home constitute one of the chief attractions. Notwithstanding this, however, very few farmers have introduced these conveniences into their homes.

Of the 400 farmers visited, 53 per cent. have young people in their families. With this large percentage of young people it is *a regrettable fact that only two farmers out of every hundred have bath-rooms in their homes. Only* 6.2 *per cent. have water closets, only* 2.5 *per cent. have a complete service, and only* 2.2 *per cent. have electric light. In these* 400 *homes, only* 16.5 *per cent. have the water piped to the house, and but* 7.5 *per cent. have furnaces in the home. These conditions are entirely within the control of the farmers,* 86.7 *per cent. of whom are the owners of farms averaging* 126.5 *acres.*

In contrast with the foregoing, the conveniences which which have been supplied by the Government and public utility companies, and of which the farmer has availed, himself, stand out prominently. The postoffice department has carried to 76 per cent. of these 400 farmers rural free mail delivery, allowing 77 per cent. of them to be supplied with daily newspapers, while 58.2 per cent. have the convenience of a telephone.

Only 2.5 per cent. have complete sanitary service in their homes, while 5 per cent. have automobiles, and 31.5 per cent. have either automobile or horse and buggy for the young people.

Much has been said and written of late to interest the farmer in the automobile, *but little is heard of such household conveniences as the bath-tub, kitchen sink, sanitary closet, etc.* The automobile may carry the rural housewife away from her drudgery for a few hours a week, and to that extent proves a blessing, *but the price of an automobile would provide a water supply and other conveniences that go with it, and render the home a home both to the housewife and the young people.*

Rural Sanitation

A Continuation of the Sanitary Science Course That Has Been Appearing in the Sanitary Engineer, But Having Particular Reference to the Sanitary Disposal of Household Wastes in Unsewered Districts.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 10

SYPHONS

THE action of the simple non-automatic syphon was explained in the preceding article. For purposes of comparison, Fig. 36, to which reference was made in that explanation, is again shown.

The tendency in all such syphons is for air to collect in the top end of the pipe retarding and, if or when there is sufficient air, eventually stopping the flow. The following interesting account of the difficulties encountered with a syphon illustrates on a large scale the difficulties that might be encountered with a small non-automatic syphon:—

(From Trautwine). 'At Blue Ridge Tunnel, Virginia, Col. C. Crozet constructed a drainage syphon 1,792 feet long, of cast iron faucet pipes, 3 in. bore, 9 ft. long. Its summit was 9 ft. above the surface of the water to be drained; and its discharge end was 20 ft. below said surface, thus giving it a head of 20 ft. At the summit, 570 feet from the inlet, was an ordinary cast iron air-vessel with a chamber 3 ft. high and 15 in. inner diameter. In the stem connecting it with the syphon was a cut-off stopcock; and at its top was an opening 6 in. in diameter, closed by an air-tight screw lid. At each end of the syphon was a stopcock. To start the flow these end cocks are closed, and the entire syphon and air-vessel are filled with water through the opening at top of air-vessel. This opening is then closed air tight, and the two end cocks afterwards opened; the cut-off cock remaining open. The flow then begins, and theoretically it should continue without diminution, except so far as the head diminishes by the lowering of the surface level of the pond. But in practice with very long syphons this is not the case, for air begins at once to disengage itself from the water, and to travel up the syphon to the summit where it enters the air-vessel, and rising to the top of the chamber gradually drives out the water. If this is allowed to continue the air would first fill the entire chamber, and then the summit of the syphon itself, where it would act as a wad, completely stopping the flow. The water-level in the air chamber can be detected by the sound made by tapping the outside with a hammer.

To prevent this stoppage, the cut-off at the foot of the chamber is closed before the water is all driven out; and the lid on top being removed the chamber is refilled with water, the lid replaced, and the cut-off again opened. In the meantime the flow continues uninterrupted, but still gradually diminishing, notwithstanding the refilling of the chamber; and after a number of refillings it will cease altogether, and the whole operation must then be repeated by filling the whole syphon and air chamber with water as at the start.

At Col. Crozet's syphon at first owing to the porosity of the joint-caulking, which was nothing but oakum and pitch, air entered the pipes so rapidly as to drive all the water from the chamber and thus require it to be refilled every 5 or 10 minutes; but still in two hours the syphon would run dry. The joints were then thoroughly re-caulked with lead, and protected by a covering of white and red lead made into a putty with Japan varnish and boiled linseed oil. But even then the chamber had to be refilled with water about every two hours; and after six hours the syphon ran dry, and the whole had to be refilled. In this way it continued to work.''

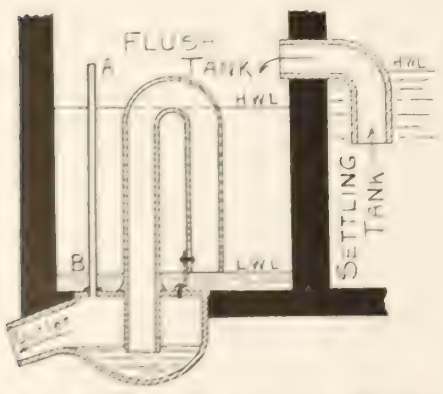


FIG 37 - AN AUTOMATIC SYPHON

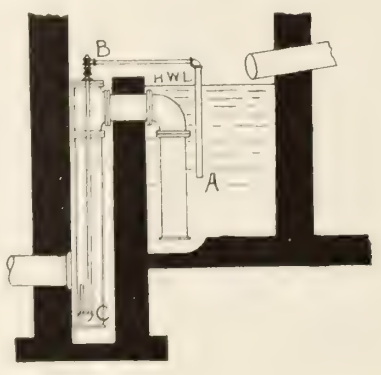


FIG 38 - THE MERRITT SYPHON

Automatic Syphons

The Encyclopaedia Britannica has been quoted to the effect that innumerable forms of syphons have been devised adapted for all purposes; and provided with arrangements for filling the tube, or for keeping it full and starting it into action automatically when required. Referring to Fig. 36, it is apparent that when both legs of this simple syphon are full of water, syphoning will commence. After once syphoning and emptying the tank, some means must be devised to again fill the legs of the syphon by the time the water in the tank has reached the level at which it is desired to empty the tank. It was shown in the last article, if the water could be raised to the level of the bend of the syphon and then water added faster than the syphon could discharge it (driving out all the air and completely filling the syphon with water) that syphoning would commence. Such an arrangement would not be practicable for discharging sewage, nor could it easily be made automatic. What now seems an obvious way of converting the simple non-automatic syphon into an automatic syphon is illustrated in Fig. 37, which figure is adapted from a drawing of a U. S. patent granted in 1882. This syphon consists of an inverted bent pipe with legs of unequal length, the longer extending into a pool of water formed in the end of the discharge leg or pipe. As the flush tank is filled, air is forced up the shorter leg of the syphon and down the other, bubbling up through the water in the discharge pool. When the water level in the tank reaches the bent portion of the syphon, water will begin to flow out. If the end of the longer or discharge leg is submerged but very little so that the overflowing water may carry with it all the air remaining in this part of the syphon, then the syphon will completely fill with water and consequently will operate continuously until the level of the water in the flush tank sinks sufficiently to allow air to enter the receiving end. The purpose of the small vent pipe AB, is to allow the air forced out through the discharge pool to readily escape and thus not retard the flow. Such a syphon cannot be relied upon if

the quantity of sewage flowing into the flush tank is too small to carry out the air with certainty when the proper level is reached. In such a case it might frequently only act as a simple overflow pipe, discharging the sewage at the same rate it was received.

A syphon of the form like that shown in Fig. 37 has the advantage that no deep excavation is required and further the syphon can be placed after the syphon chamber or flush tank is constructed. The original simple form has been improved in various ways to make it more positive in action. One form of such improvement, known as the Merritt Automatic Syphon, is illustrated in Fig. 38, the following description thereof being taken from Ogden and Cleveland on Practical Methods of Sewage Disposal:—

"The main discharge pipe is built in the form of a "U" tube, the longer leg containing an auxiliary small air pipe, with a return bend at its lower end. When the chamber starts to fill, this small pipe bend or seal is filled with water, so that the rising water confines and compresses air in both the large and small "U" pipes. In time, and at any desired height, determined by changing the relative lengths of the parts of the small pipe syphon, the seal is broken and air escaping draws air enough from the large pipe to start it in action."

Of all syphons those of the Miller type seem to give the best satisfaction. Fig. 39 illustrates some features of the various forms of this type, which are generally manufactured in two pieces, a cast iron bell and a cast iron curved pipe. Comparing with Fig. 37, it will be seen that the discharge pool is replaced by an inverted syphon arrangement or trap and the upper part of the ordinary syphon has been replaced by a bell. The curved pipe part of the syphon has to be set in place (generally surrounded with concrete) in the floor of the flush tank when it is being constructed. Before operation, this part of the syphon is filled with all the water it will hold; and the bell is placed on the top of the long leg of the trap, where, on account of its construction and weight, it rests securely while the flush tank is filling with water.

The original Miller syphon was invented by Sidney W. Miller, in 1891. For successful operation of syphons of this type, it is essential that full opportunity be given for air to be drawn into the syphon after each discharge. Mr. Miller, therefore, provided an auxiliary pipe syphon inside the bell (see Fig. 39 (a). This drew the water in discharging below the bell giving the air free circulation so as to completely "lock" it. Sniff holes and auxiliary vents were subsequently found to be an improvement on the auxiliary pipe syphon and are now used as shown in Fig. 39 (b), (c), (d) and (e).

The action of the present Standard type of Miller syphon which is the form shown in Fig. 39 (b), was described by S. Fischer Miller in an article published in the Journal of Engineers' Society of Pennsylvania, February, 1912. It is important for the engineer to understand fully the principle of this syphon now so widely used, and therefore extracts from that article relating to the operation of the syphon are given as follows:

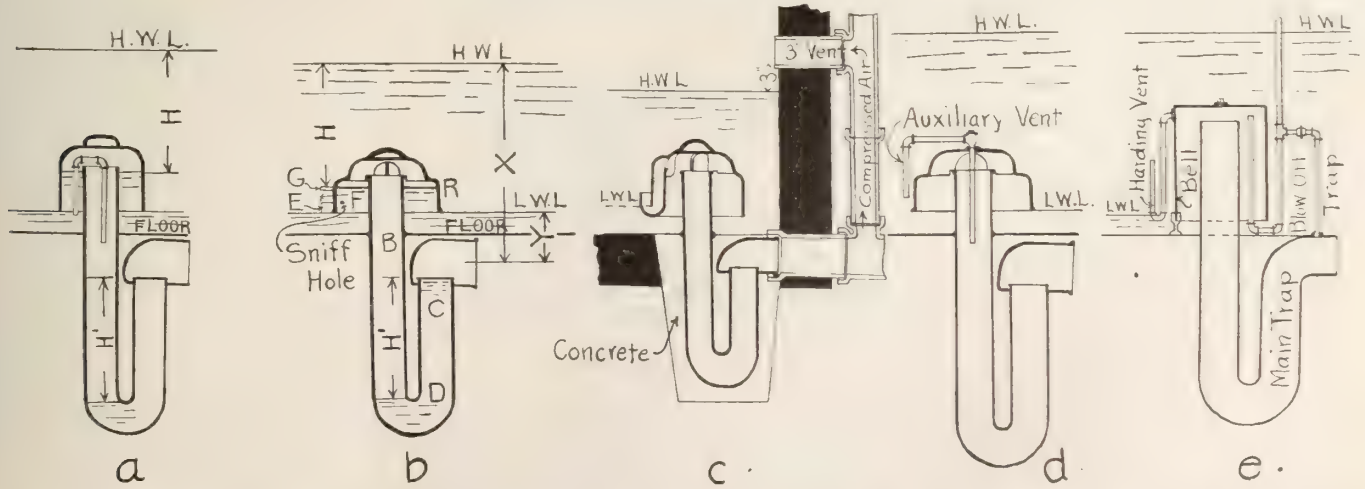
"As the water rises in the tank it reaches the sniff hole in the side of the bell and when this is covered, immediately the confined air in the bell and the longleg of the trap starts to push downward, the column of water in the longleg of the trap (B) toward the bend at (D).

During the period of filling the tank, the column of water in the shortleg (C) is slowly spilled out by the pressure of the air and the column of water in the longleg (B), so that when the high water line in the tank is reached we have the water line (the compressed air column being behind it) just at the flattened bend (D), the water line inside the bell being near the top of the longleg at (R).

By using a scale, or dividers, one will see that the distance (H) from top of water line inside of bell at (R) to the high water line in tank is equal to the distance (H^1) from the flattened bend at (D) to the sop of shortleg (C), hence a balancing of water columns results (if no further water is admitted to the tank); this equilibrium being upset by the addition of a small amount of water to the tank, so that the compressed air expands at the flattened bend (D) into the sewer, comes back to the tank through the overflow (or vent) pipe; the water in the bell suddenly rises (the air seal being released) and the syphon is set in action (all the compressed air being expelled as stated before), and the water in the tank is rapidly drawn down and discharged into the sewer.

When the water reaches the bottom of the bell, air is introduced, breaking the vacuum, and complete circulation is established as the sniff hole is now above the water line in the tank, and the syphon is completely air locked; the trap is again primed and everything is ready for a second dose to be held back until the high water line in the tank is again reached, when the discharge operation is repeated.

The draught of the syphon consists of four factors; first, the distance (E) from bottom of bell to sniff hole; second, the distance (F) which the water rises inside the bell from the sniff (due to displacing the column of water in the longleg); third, the further rise (G) of water in bell (due to the air compression); and fourth, the depth (H) of



(a) Original Miller Syphon Invented 1891 (b) Standard Sewer Flushing Type (c) 3" and 4" Sewage Syphons (d) 5" and Over Sewage Syphons (e) With Blow-Off Trap and Harding Vent

FIG. 39—FORMS OF THE MILLER AUTOMATIC SYPHON

water in the seal (or shortleg), as shown in the cut.

Briefly stated, the trap is to hold back (by its seal) the needed head to give the desired rate of discharge; as the water in the tank must flow out as rapidly as possible; and the bell is to enclose the air until the syphon is in action, when it will act as an easy entrance for the water passing under its rim. The air must be entirely out of the bell during the discharge period to cause the syphon to discharge rapidly, and the bell should weigh enough to stay in its place without ballasting and still be readily lifted out if needed. Furthermore, an instantaneous and complete air-locking is needed after each discharge, the bell should have either a vent, or sniff, the latter being preferred, as it need only be a small-bushed-hole.''

In his later designs of syphons which are more particularly adapted for large installations, Mr. Miller employed an auxiliary automatic blow-off trap. This blow-off trap has always a depth of seal less than that of the main trap and consequently requires less head to force, which is an advantage with the larger syphons. The device also overcomes difficulty frequently encountered of securing operation of the syphon when the rate of flow in the flush tank is very small compared with the rate at which the syphon can discharge when operating at its full capacity. Fig. 39 (e) shows a Miller syphon provided with a blow-off trap and also what is known as a Harding vent. Both trap and vent can be made in adjustable forms, in which case the former can alter the high water level in the tank while the Harding vent when variously adjusted changes the low water level.

MONTREAL TECHNICAL SCHOOL

(Continued from page 17.)

ine; two screw-cutting machines; one Hartford automatic screw machine; one 7-in. slotting machine; one pantograph; one Columbia winding machine; one set 4 x 30 in. Brown Boggs forming rolls; one Max Ames power press; one profiling machine; one 36-in. Brown Boggs shear; one Norton universal grinder; two Montreal Technical School hack saws; two J. G. Blount grind stones and two 12-in. emery wheels.

In a separate room are two Stewart furnaces for hardening and tempering tools and dies.

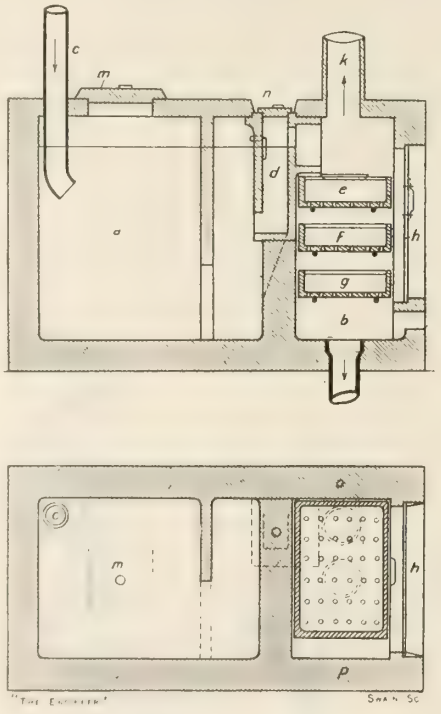
Oxy-Acetylene Welding

So as to keep pace with the progress being made in the use of the blow pipe for cutting and welding purposes, the authorities of the school, at the opening of season of 1914-15, started a night class on the uses and operation of the oxy-acetylene method of autogenous cutting and welding. This latest branch of technical education has met with very encouraging success. Some of the results of the first year's work are shown on the right hand table and wall panel illustrated in Fig. 4. This department is under the direct supervision of the ''L'Air Liquide'' Society.

FIG. 13. PHYSICAL LABORATORY.

SMALL SEWAGE PURIFYING PLANT.

A small sewage disposal plant was described in a recent issue of our contemporary Le Genie Civil, which states that it had derived it from the Bulletin de l'Association des Industriels de France contre les accidents de travail. The plant is illustrated in the accompanying engraving, which is reproduced from the pages of our contemporary. It is described as being intended for a family of about five persons, and is divided into two portions, a tank and a tray chamber b. The tank is itself practically divided into two unequally sized compartments by a vertical wall, through which, however, is a communication passage at the bottom. The sewage enters the tank a through the pipe e, the discharge from which is below the level of the liquid. The digested liquid flows away into the tray chamber b through the passage d, and falls on its way to the discharge pipe l through the series of trays e, f and g. The top tray contains iron-scale, the middle tray puzzolana, and the bottom tray peat. The three trays fit into the chamber exactly like drawers and fill it from side to side, but are not as long as it is, and they are staggered alternately with their ends abutting against the walls o and p, so that a zig-zag passage-way is left for a current of air from the inlet j to the ventilating outlet shaft k. The tray chamber is closed by means of a door h, which fits into grooves and can be sealed in them. The chamber a is provided with a manhole m and the outlet chamber d with a handhole n, both provided with a cover which can be hermetically sealed.

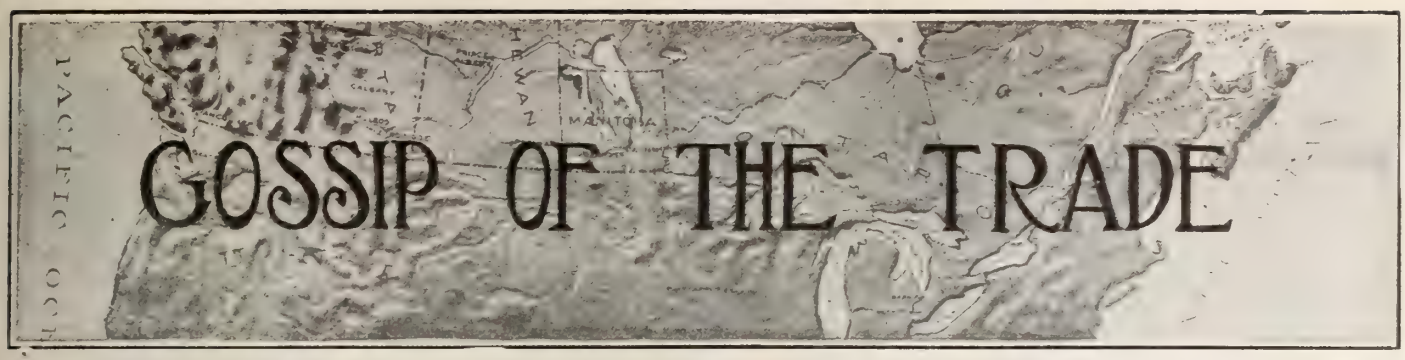


A unique Septic Tank.

It is said that a plant constructed on this plan is in operation at the works of L'Ouest Lumiere at Puteaux, and that it is giving good results, the effluent possessing neither a putrid nor an ammoniacal odour, and being high in nitrates.—The Engineer, London, Eng.

NEW BOOKLET

Water Lift Pump.—The Buckeye Pump Mfg. Co., Columbus, Ohio, have issued a folder containing suggestions for installing the ''Buckeye'' water lift pump, together with a diagram showing the necessary piping and connections for a typical installation. A sectional view of the pump is included showing its construction, accompanied by a table giving the principal dimensions of the various sizes.



TORONTO VISITORS

R. G. Sturgeon, sanitary and heating engineer, Peterborough, Ont., took in the Exhibition last week.

NEW CATALOGUE

The Pease Foundry Co. are distributing a 16-page 6 x 9 catalogue to the trade which describes their "Ideal" smokeless down-draft boiler. Some very novel claims are made for this line of boilers. Full particulars, as well as one of these catalogues may be procured upon application to the above address.

FIRES IN TORONTO

Toronto fire department have been kept rather busy recently putting out fires, which appear to have a mysterious origin, and it is felt that there are a few fire bugs operating, especially in the vicinity of Queen West.

As a result of one of these fires, F. R. Maxwell & Co. suffered a loss of about $300 recently.

EXHIBITION NOTES

It was very encouraging to see the number of sanitary and heating engineers in attendance at the National Exhibition, and, speaking to one or two, it was learned that they "came to see what's new," and without doubt the manufacturers of sanitary and heating appliances were not in the rear.

Every line was splendidly represented, and quite a lot of improvements were in evidence in all lines, which proves that, although our country has been at war for over two years, the wheels of progress and invention have by no means been at a standstill.

Haileybury was well represented at the National Exhibition last week, when F. R. Gibson, sanitary and heating engineer, visited the various booths, displaying goods to those interested in sanitary and heating specialties.

B.O.T. MFG. CO. APPOINTS NEW CITY SALESMAN

A new face has entered the sanitary engineering field in the person of S. F. Staneland.

Mr. Staneland is a Toronto boy, and entered upon a business career some eight years ago with W. R. Brock & Co. as entry clerk. He gradually worked his way up to the position of salesman and city traveller.

However, with an eye to still further advancement, Mr. Staneland became acquainted with the manager of B.O.T. Co., resulting in his appointment to the position of city representative.

S. F. STANELAND
Recently appointed City Salesman for B.O.T. Mfg. Company.

Born 28 years ago, with youth on his side and a congenial disposition, no doubt Mr. Staneland will make a success of this his new calling.

DELINQUENTS TO BE PROSECUTED

A number of prominent property owners are to be summoned before Magistrate Farrell for their failure to instal proper sanitary conveniences in their houses. This decision was reached at a meeting of the Kingston Board of Health held recently after the report of Sanitary Inspector Timmerman had been received. The Inspector stated that several of these delinquents had been repeatedly warned.

Several complaints about sewer were received. Citizens also complained that water had been flowing from the sewers into their cellars. The City Engineer was instructed to look into the matter.

In all there are 426 houses in the area where the sanitary improvements have to be put in, and a proper notice has been served to each owner or agent to comply with the law.

Since June last there have been 150 put in and some have given their order to the plumbers. Taking into consideration the scarcity of labor and the high prices of material and labor the people have done remarkably well in putting in the improvements.

INSTAL SEWAGE SYSTEM

E. A. James, C.E., has prepared plans for the installation of a sewage system in Aurora, and, while the exact cost has not been decided, it is the intention of the municipality to proceed at once with the work. This will be the first municipality in the county to adopt an independent sewage plant, and the town certainly deserves credit for the undertaking. It is painful to know of the scores of small towns and even villages which appear to make no pretence whatever of having sewers and sewage disposal plants installed so as to make their locality sanitary and fit to live in.

The conditions could be very much improved if we had a Federal Department of Health, simply because being federal all manner of conditions could be taken into account, and when one purely local obstacle was overcome, the same experience might be applicable to another district in another province. There is altogether too much overlapping in our work.

Inquiries have proved that in many cases the experience gained by one town at considerable cost has been taken advantage of by another town at no cost to the latter. One town waits for the other to make a move, whereas if we had a Federal Department of Health research work of all kinds could be carried on, and each and all pay their share.

A provincial research department would be too small. One province would say: "We'll wait and see how the adjoining province conducts its work, and what the results are."

Just as Toronto is doing. Our poor commissioner says: "Let's wait and see what experience Milwaukee has with their experiments with activated sludge, and then we shall share in the benefits of their experience, and Milwaukee bears

all the cost." As with all such methods of doing business Toronto will, it is to be hoped, "get stung." Have we no men in our council who have backbone and honesty enough in them to see that this is dishonest? What Toronto herself should do is conduct experiments of her own and bear the cost honestly. She has brains enough within her own boundaries to solve the sewage disposal problem properly; and if Toronto would take a firm stand and get busy, then she could plead her case in favor of a Federal Department of Health to assist her in solving this problem.

MUST PROCURE PERMIT.

The following notice appeared in a recent issue of the Fredericton N.B. mail, which speaks for itself. It goes to prove that the Maritime province is far ahead of some other provinces in Canada. One of the reasons why some farmers have refrained from installing sanitary appliances is because of trouble caused by poor cheap installations being sold by cheap jacks, handy men, etc.

Board of Health Notice

The attention of all citizens is hereby called to the following sections of the Provincial Plumbing regulations:

7. Before proceeding to construct, reconstruct, renew, add to, alter or extend any portion of the plumbing or drainage system of any building or premises, the contractor, plumber or person contracting or having charge of the same, shall (except in the case of leaks) obtain from the Local Board of Health a permit for the contemplated work.

10. The owner and the occupier of any premises in connection with which any work is done (for the doing of which a permit is required under this section without a permit, shall, as well as the person actually doing the work, be deemed to be guilty of a violation of these regulations.

Notice is hereby given that in future all violations of the above rules will be prosecuted, and the Inspector of Plumbing in this city has been instructed to take immediate proceedings in the Police Court against the parties [illegible]

Dated this 1st September, A.D. 1916.

By order of Fredericton Board of [illegible]

CHAS. W. BECKWITH,
Secretary.

CALL FOR NEW TENDERS

The Town Council, Aylmer, Que., have decided to call new tenders for the proposed filtration plant, the recent bids having been rejected.

A PLUMBER'S WAR POEM

The following lines entitled "War," are no doubt to the point: The "plumber," sanitary and heating engineer, or whatever title he claims, is in this big fight with clean hands. He is doing his bit, and we are proud of him. We know hundreds personally who have left their business, their occupation and their loved ones to fight the insane Hun, and let us not forget that the term insanity is very closely allied with the term insanitary. The former refers to morals, thoughts and actions; the latter refers to matter. Insane minds, such as that possessed by the Prussian anarchist, have to be stamped out of existence just as all insanitary matter has to be, and Eva E. Hamilton has certainly grasped the spirit in writing her poem, "War."—Editor.

"WAR"

A plumber crouched in a Belgian trench,
Writing a short letter home.
From no-man's land rose a heavy stench,
Where ghastly legions roam.

"Dear mother," he said, "I think of you now,
After the bloody fray;
The 'little grey death' got Curly Bob;
I saw him fall to-day.

"Through scourge of hell for Liberty,
Battling for all that is dear;
It hurts to see your best pal drop,
But anger dries the tear.

"While we never say die for the grand old rag,
Yet revenge hath a stirring pull;
To crush the Boche with a ruthless hand,
Till we pay heart scores in full.

"We are out on a contract mighty big,
But we are here to stay 'till it's done;
No Isaac will sojer on the job
While we rout the cowardly Hun.

"Our hand grenades we thread so true,
They dart through the Kaiser's lair;
The roar of our steel-clad fittings whiz,
And wipe out their joints with care.

"When we get the lead-cinch finished smooth,
Then comes the final test;
We give them the swift crossover
And our bayonets do the rest.

"When Peace is refiled on the work-bench of Life,
Then Truth and Honour will reign;
The map will be cleaned of the German plague
By the force of the Lion's mane (main).

"It's great to be in on a finished job,
But I am proud to be here at the start;
God willing—I take up my kit-bag again,
I will know I have played my part."

EVA E. HAMILTON,
Kingston.

FRENCH AND ENGLISH

Getting business these days means real work, and J. R. Devereux & Co., Montreal, appear to be out to get the business. Mr. Devereux has recently prevailed upon several houses whom he represents to issue illustrated catalogues and folders describing the various lines manufactured by them. This literature is published in both French and English, and is certainly appreciated by those of his many French-speaking friends.

Mr. Devereux has a wide circle of friends in Ontario, Quebec and the Maritime Provinces, and is out to give service, knowing full well that service brings in business when even money will often fail. The latest catalogue to be issued in the French and English language is one describing the line of pipe threading and cutting tools manufactured by A. B. Jardine & Co., Hespeler, Ontario.

ENDORSES ACTIVATED SLUDGE SYSTEM OF SEWAGE DISPOSAL

The City Engineer of St. Thomas, M. E. Ferguson has returned from Milwaukee where he was sent by the city council on a tour of inspection to inquire into a new method of sewage disposal being tried out at that city.

Speaking briefly of the impressions gained, Mr. Ferguson said he thought the system employed there was a good one. That city has been operating an experimental tank with what is known as the activated system .It consists of ordinary sewage tanks, first a receptacle for raw sewage then a sedimentation tank, through which air is pumped. The sediment is taken away and pressed into blocks and used for fertilizer and sells for $9 a ton. Twenty-five per cent. of the overflow is then pumped back into the first tank and goes through twice. There is a 98 per cent. purification at the final overflow from the tanks. A comparatively small tank treats a million gallons a day. The St. Thomas disposal works consists of three huge tanks which treat only two million gallons a day.

Milwaukee has decided that the system is the best they have tried and they have had an extensive experience with sewage disposal systems in that city. The experiment has been successful enough to impress them with its efficiency and they are now laying out their ground for a two million dollar plant along that line.

Mr. Ferguson said he had not made any figures on the feasibility of adapting the local plant to the new method but thought that it could be arranged. In the case of activated sewage coming into use here the present tanks would be sufficient to take care of the city's needs for a very long time and it would possibly only require a small part of their capacity for present use. The means for pumping the air into the tanks would seem to be about the only change necessary.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

Position of Septic Tank

Editor The Sanitary Engineer:

I enclose herewith a rough sketch of drain from septic tank, the absorption tile is to be laid 14 inches below the surface of the ground. In doing this the tank will be away above the ground and the inlet from house to septic tank too high to be of much use. I would like your opinion in the matter, as to how you would drain the lower part of the building.—G. E. P. S.

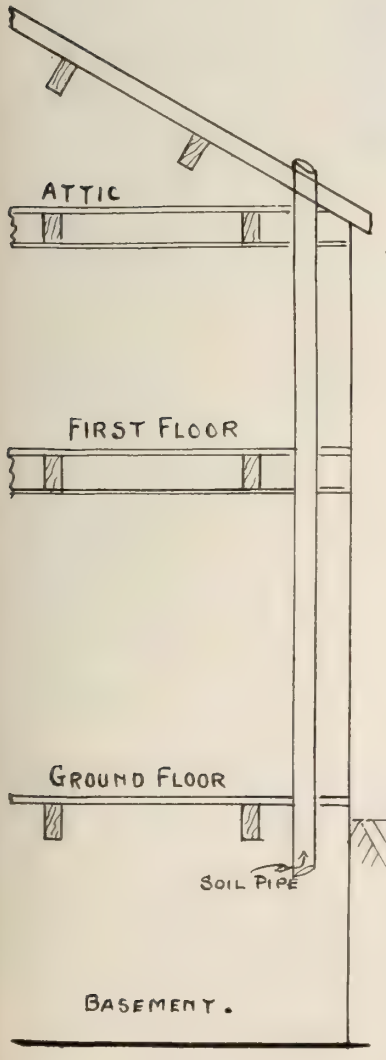


Fig. 1 shows the sketch sent in by our correspondent, G. E. P. S. But on account of the proportions to which the sketch is drawn, it appears to be a little misleading.

In the first place, all septic tanks are raised above the level of the ground which is to be used for absorption beds, unless some means other than a syphon for discharging the sewage from the septic tank to the dosing chamber is used.

Fig. 2 is an enlarged view of a portion of the dosing chamber, showing a 3-inch syphon, pipes laid 14 inches below

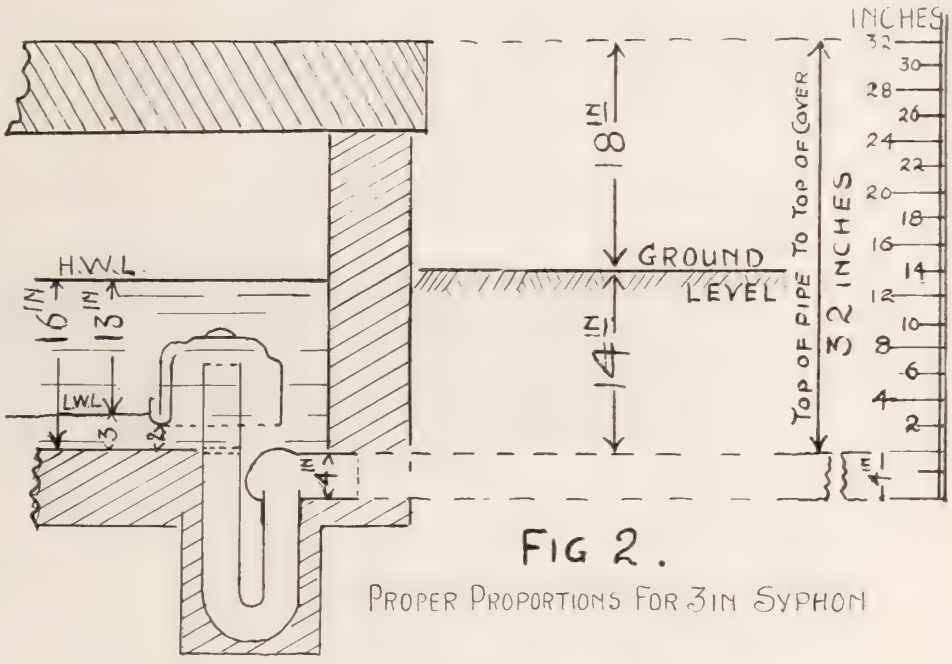


FIG 2.

PROPER PROPORTIONS FOR 3IN SYPHON

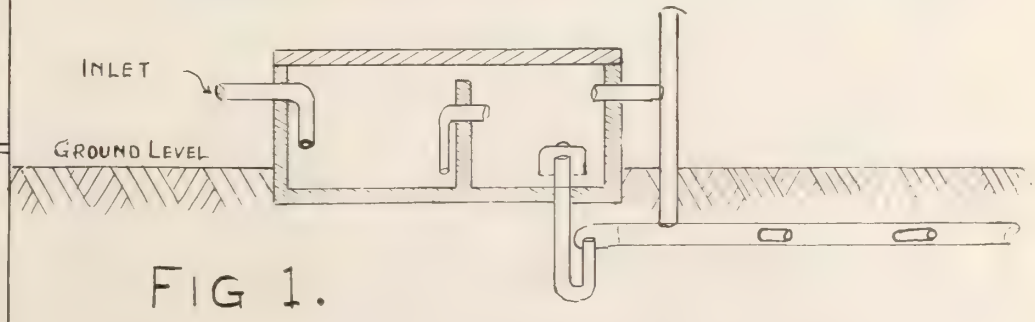


FIG 1.

SKETCH SUBMITTED BY INQUIRER G.E.P.S.

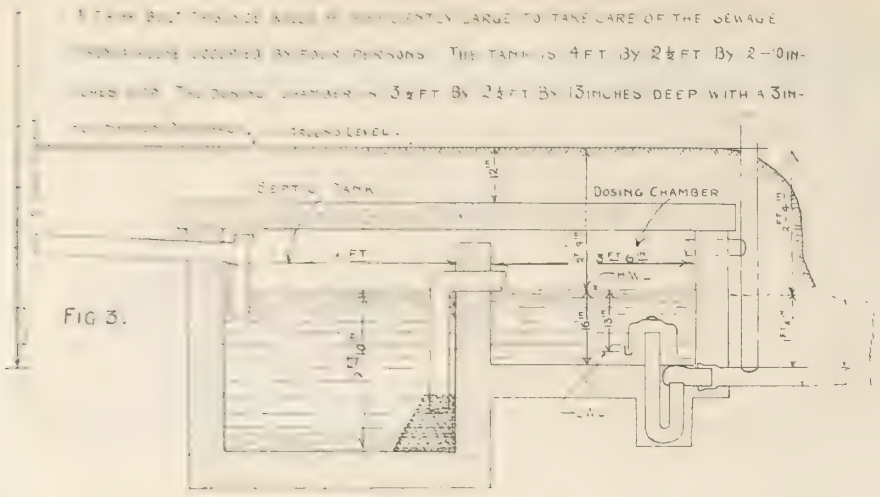


FIG 3.

the surface of the ground to be used for the absorption or sewage disposal bed.

It will be seen that the sewage at high level is one inch lower than the surface of the ground because a 3-inch syphon discharges when the sewage is 16 inches deep in the tank and 13 inches from the syphon break, or snift outlet.

Most houses are built with the ground floor at least 30 inches above the mean level of the ground, and in that case it is a very easy matter to build a septic tank using a low head syphon, such as the one shown, and as stated before, as a 3-inch syphon discharges 13 inches of sewage, the tank would have to be built shallow to meet the conditions.

Fig. 3 is another sketch which shows the true height or measurements, along with the ground floor level.

Of course, if the basement is to be drained, some mechanical means will have to be adopted to raise the sewage up to the dosing chamber, as shown in Fig. 4, or else the whole tank may be built low and the contents of the dosing chamber discharged direct into the tile pipe. Fig. 5 shows how this may be done.

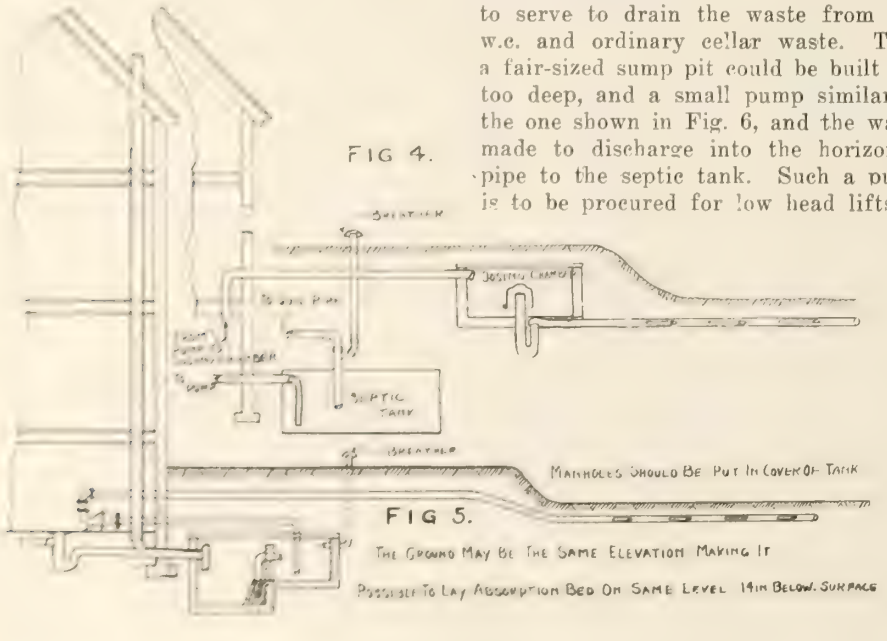

SEPTIC TANK
MANHOLES SHOULD BE PUT IN COVER OF TANK
THE GROUND MAY BE THE SAME ELEVATION MAKING IT POSSIBLE TO LAY ABSORPTION BED ON SAME LEVEL 14in BELOW SURFACE

FIG 4.

FIG 5.

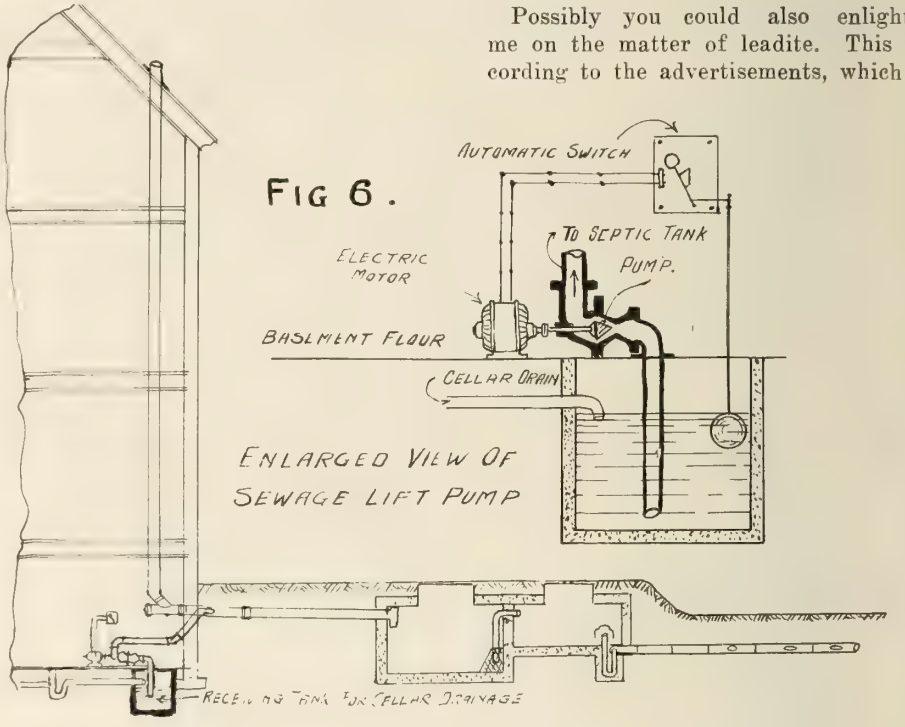


FIG 6.

Another method can also be adopted. The cellar may not need very much draining, for instance, it may only need to serve to drain the waste from one w.c. and ordinary cellar waste. Then a fair-sized sump pit could be built not too deep, and a small pump similar to the one shown in Fig. 6, and the waste made to discharge into the horizontal pipe to the septic tank. Such a pump is to be procured for low head lifts at a very moderate cost, considering the work they will do in draining a basement floor.—Editor.

INFORMATION ON AMALGALINE AND LEADITE JOINTS.

Editor The Sanitary Engineer:—

I would like to know whether Amalgaline joints as advertised in The Sanitary Engineer are used in the large towns and cities in Ontario and therefore approved by the plumbing inspector's department. Especially would I like to know whether the city of Toronto allows it to be used in the place of the regular wiped joint, also is it a practical substitute and how long has it been in use?

Leadite Joints.

Possibly you could also enlighten me on the matter of leadite. This according to the advertisements, which so far as I have seen only appear in the U.S. publications is a composition for jointing cast iron water mains and requires no caulking.

I. P. P.

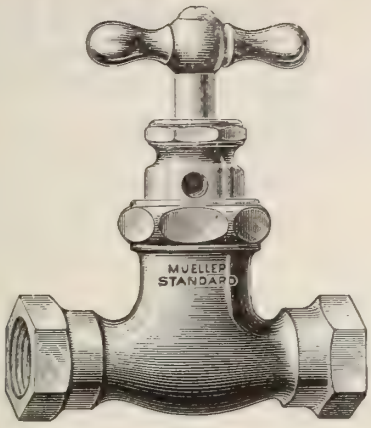
Regarding Amalgaline joints, the writer made some very severe tests before accepting advertising for this material, and amalgaline withstood all manner of tests, pressure, tensile strength, acid test, as a substitute for lead burning too.

It has been in use in England for upward of 7 years and as far as can be learned has stood up well.

The City of Toronto plumbing dept. has just recently sanctioned an installation of plumbing with amalgaline joints as a test. But will not as yet approve its use, until the department is thoroughly assured of its practicability.

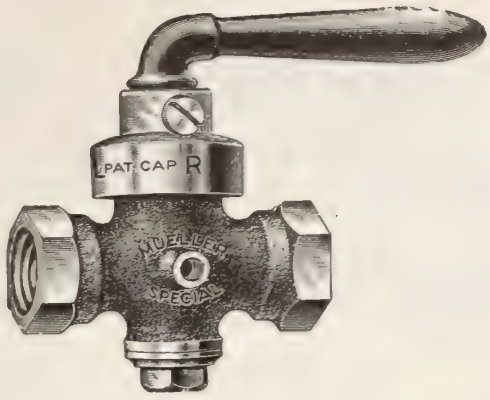
From what can be learned, it is finding a very ready sale.

(Continued on page 42)



Mueller Compression Stop and Waste Cock

Made of high copper bearing Bronze—nothing but virgin metal used.
Encased seated washers of the highest grade.
Perfectly fitted threads throughout.
All parts interchangeable.
Pressure is not open to waste when being turned on or off.



Mueller Stop and Waste Cock

(GROUND KEY WORK)

Made for Iron, or Lead Pipe as well as Lead and Iron. Heavy Pattern with free, clear waterways. Smooth working.

Mueller
Tested 200 lbs. Hydraulic Pressure
And Unconditionally Guaranteed
Plumbing Brass Goods

IT is greatly to your interest to use only the very best in stop and waste cocks. Poor stop and waste cocks have cost more to the consumer, as well as the trade, than any other piece of brass goods used in the sanitary and heating business.

A stop and waste cock that fails to act in case of emergency may cause serious damage to your customer's home and your reputation.

MUELLER STOP AND WASTE COCKS are positively reliable. Whether they are operated often or once in months or years, they are ready to act efficiently.

Once operated may be worth several times the first cost.

Nearly 60 years' experience, supreme efforts to produce only the best in brass goods, and our unconditional guarantee stand behind these and all other Mueller lines.

Write for complete catalog.

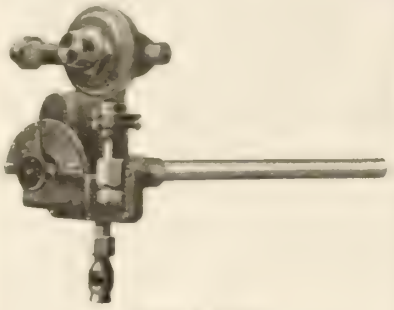
H. Mueller Mfg. Company, Limited

SARNIA, ONTARIO

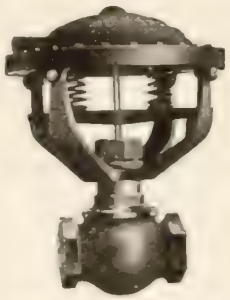
Makers of High-Grade Water, Plumbing and Gas Brass Goods.

POWERS MONEY SAVERS

No. 10 Tank Regulator



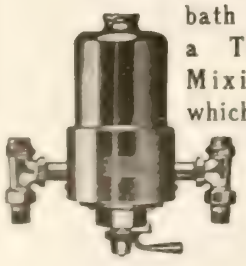
REGULATOR



Applied to Domestic Water Heaters. Prevents Over-heating and Saves Steam.

DIAPHRAGM VALVE

Satisfaction Guaranteed



Powers Shower-bath Controller a Thermostatic Mixing Valve which insures a constant temperature.

Easily adjusted to any desired temperature.

Positively Anti-Scalding

The Canadian Powers Regulator Co., Ltd.

159 Richmond West, TORONTO

INFORMATION ON AMALGALINE AND LEADITE JOINTS.

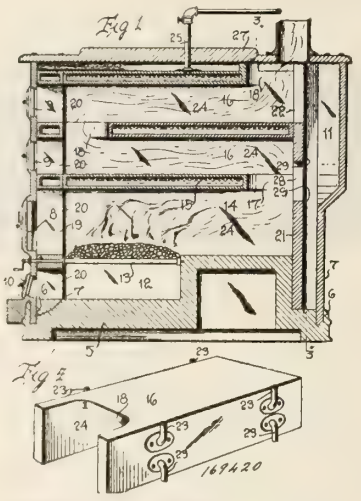
(Continued from page 40)

Regarding Leadite, the writer never heard of it, and would be pleased to know where it can be procured so as to be able to look into the merits of the material.—Editor.

CANADIAN PATENT.

(Continued from page 39)

its margin with a continuous channel, an outer shell secured at its lower edges in said channel, said shell being provided in its rear wall with a vertical smoke outlet flue, a vertical tier of water chambers mounted upon the base, said chambers being of inverted U-shaped form and the top walls thereof spaced apart to provide longitudinally extending flues, said top walls of the adjacent chambers being cut away at their relatively opposite ends to afford communication between said flues, the uppermost flue and the firebox being in communication with the smoke outlet flue, a plurality of vertical water legs connecting the



169,420. Hot Water Furnace.

opposed side walls of adjacent water chambers and affording communication therebetween, a water outlet pipe connected to the upper water chamber, return pipes connected to the opposite sides of the lower chamber, and a manually operable valve for controling the passage of the products of combustion and causing the same to pass directly from the firebox to the smoke outlet flue or to travel alternately through the several longitudinal flues between the water chambers.

AGENCIES WANTED

A man having excellent connection with plumbing trade throughout Canada would like to secure agencies for two or three reliable lines. Can furnish best of references, bond if desired.

Box 312 THE SANITARY ENGINEER

PURO SANITARY

Drinking Fountains

WILL PROVE A PROFITABLE LINE TO HANDLE

BECAUSE

The "Safety First" movement, which is becoming more popular every day, is particularly forcible where the conservation of the Public Health through pure drinking water is concerned. The old-fashioned, disease-laden public drinking cup will soon be but a memory in thousands of plants, offices, shops, public parks, schools, etc.

Herein lies the opportunity of the live Sanitary Engineer to materially add to his business by getting after those institutions and supplying them with the "Puro," the most economical and sanitary drinking fountain on the market.

The Puro Sanitary Drinking Fountain will recommend itself because of its simplicity of attachment, and its automatic control.

Write to-day and let us show you how to make a handsome profit, not only on the sale, but also on the installation of the "Puro."

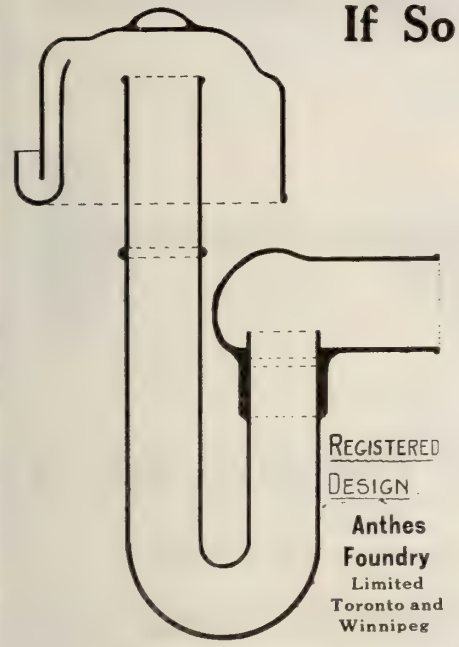
Puro Sanitary Drinking Fountain Company

147 University Ave., Toronto, Canada

Kindly Mention This Paper When Writing Advertisers

Are You Buying Syphons?

If So Your Jobber Can Supply You



(Made in Canada)

NOTE THE LONG CAULKING LENGTH

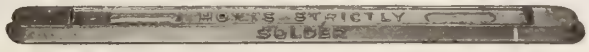
WHEN ordering, specify "Anthes." Made in various types, with tapped inside vent and twin connections. Write us for further information.

WE manufacture a full line of cast iron soil pipe and fittings from two inches up, in both flat and round beaded hubs.

Anthes Foundry Limited

TORONTO AND WINNIPEG

Our Mixed Metal Sales Amount to Over $5,000,000 Annually

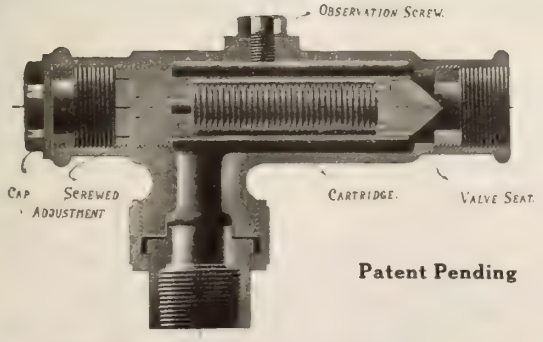


HOYT'S WIPING SOLDER is as perfect as experience and first class ingredients can make it. As only one perfect Wiping Solder can be made we manufacture only one grade, which must necessarily be Hoyt's high standard of quality.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends. Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO

New York, N. Y.; London, Eng.; St. Louis, Mo.



Patent Pending

The "WELO" Trap is guaranteed to pass air or water freely, but to shut off against steam.

"WELO" TRAPS

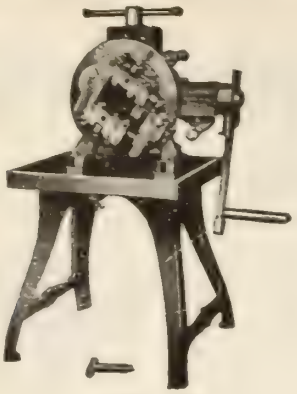
For High and Low Pressure Steam, Vacuum or Vapor Heating.

Made in Canada

BY

VICI RADIATOR COMPANY

HAMILTON, ONTARIO



No. 00

PIPE MACHINES

Either Hand or Power

This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
A time and labor saving machine.

Manufactured by

THE ARMSTRONG MFG. CO.
317 Knowlton Street
BRIDGEPORT, CONN.
WRITE FOR CATALOGUE

World-Famed Specimens of the Age of Steel

TRIMO TOOLS

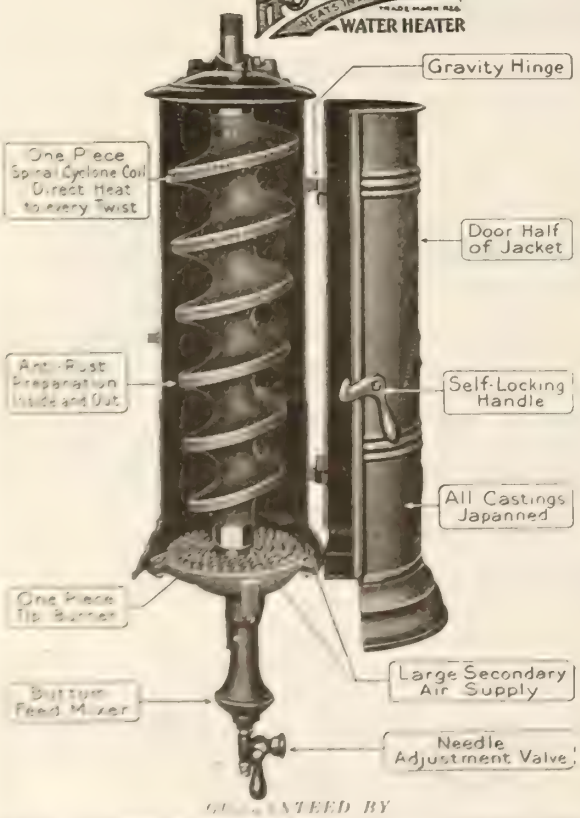
WITH FLAT-LINK OR CABLE CHAIN

Send for Catalog No. 91

MADE BY

TRIMONT MFG. CO., 55 Amory Street, Roxbury, Mass., U.S.A.

The Hotstream HEATS IN A HURRY
WATER HEATER


Gravity Hinge
One Piece Spiral Cyclone Coil Direct Heat to every Twist
Door Half of Jacket
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Self-Locking Handle
All Castings Japanned
One Piece Tip Burner
Large Secondary Air Supply
Bottom Feed Mixer
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GUARANTEED BY
THE HOTSTREAM HEATER CO. - CLEVELAND

Don't Buy Pipe Wrenches! Buy Insurance

Williams' Improved "VULCAN" Chain Pipe Wrench

lately awarded the P. P. I. E. Grand Prize, has double-ended reversible jaws, machine-tested chains and full chain contact which insure long life, complete safety and total absence of crushed pipe.

J. H. WILLIAMS & CO.
77 RICHARDS STREET BROOKLYN, N.Y. CITY
THE WRENCH PEOPLE

Western Office and Warehouse,
40 So. Clinton St., Chicago, Ill.

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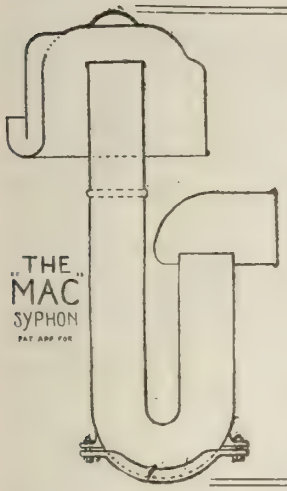


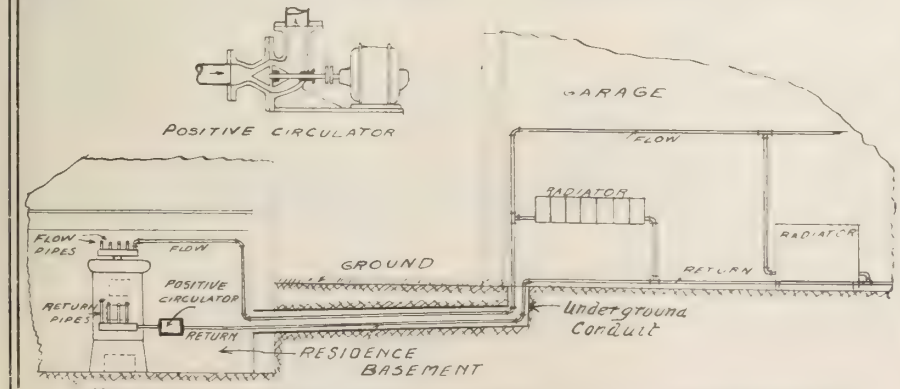
We Unconditionally Guarantee
Every Syphon We Sell

And can furnish from stock at a moment's notice. We make several sizes from 3 inches up. We also carry a full line of high-grade cast iron soil pipe and fittings.

Write us for prices, discounts and further particulars.

WEST TORONTO FOUNDRY COMPANY

Cor. of Mulock & Junction **West Toronto**



Showing how a circulator is installed on present house furnace to supply radiators in a garage or other out-building.

Something New

This circulator is specially designed for circulating water in a hot water system. It will save fuel, and smaller piping can be used. Every circulator guaranteed. Write us for further particulars.

ROBERT ANGUS

Heating Specialist

514½ William St., LONDON, ONT.

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Air Valves.
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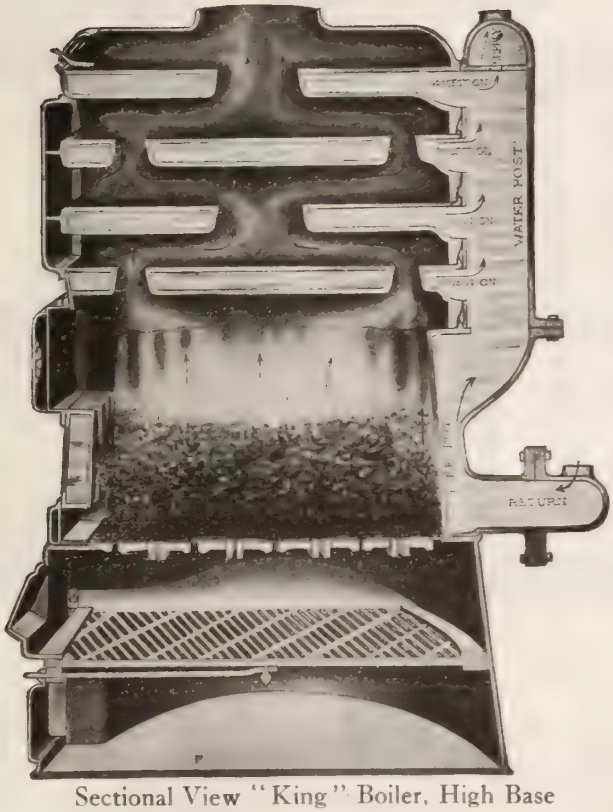
Take A Look At The Inside

IT'S DIFFERENT

A Canadian By Birth, First, Last And Always



Sectional View "King" Boiler, High Base

Built On Right Lines That Will Hold And Make Good

IF a hot water boiler has deep waterways and narrow heatways, the water is too solid and the heat cannot penetrate through it. Such a boiler will be a fuel consumer and give very little service.

NOT so with King Hot Water Boilers. Note the thin waterways and wide heatways. Just look at the deep fire-pot. Every pound of coal is given a chance to transmit heat to the radiators. These are the points which make King boilers the best seller on the market.

Write Us for Further Information

STEEL AND RADIATION, LIMITED

HEAD OFFICE: FRASER AVENUE, TORONTO

Showrooms: 80 Adelaide Street East, Toronto

304 UNIVERSITY STREET, MONTREAL **101 ST. JOHN STREET, QUEBEC**

Agencies in all the Leading Cities in Canada

DART UNION PIPE COUPLINGS

Bronze meets Bronze—there is no possibility of rust or corrosion—nothing to decay and cause leakage.

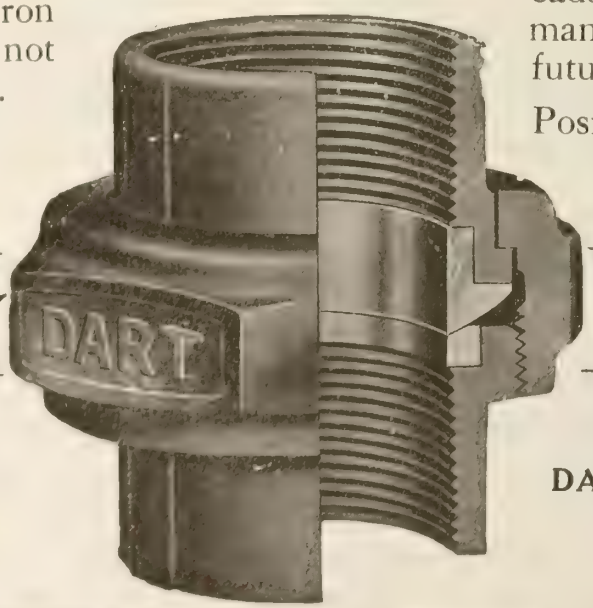
The efficiency of the Dart is made doublesure by the heavy iron parts which will not stretch or pull apart.

BRONZE TO BRONZE at the Joint

Dart Unions are easy to use—you can make the connection quickly, whether pipes are in or out of alignment.

They are a valuable asset to a business because they ensure permanent satisfaction and future business.

Positively guaranteed.



PERMANENTLY EFFICIENT

Your Jobber Sells Them

Manufactured by
DART UNION CO., LTD.
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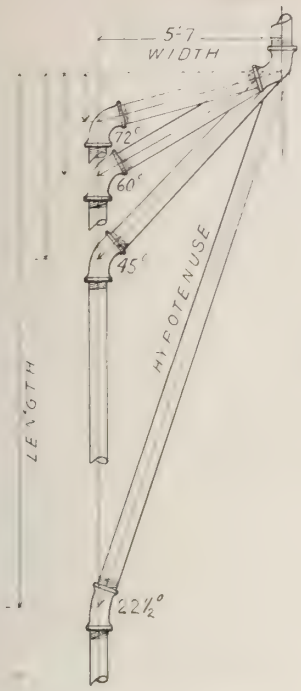
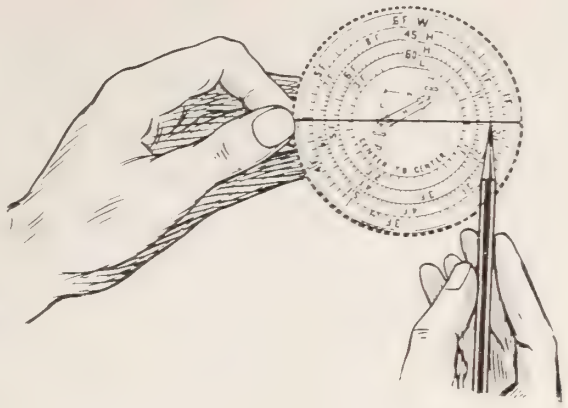


Angle Measurements made easy with

Kolar's Pipe Fitters' Scale

For Plumbers, Gas and Steam Fitters and any mechanic who has pipe angles to measure.

EASY—SIMPLE - CORRECT



Kolar's Scale is to assist mechanics, contractors and architects, in cutting angle pipe, making estimates, or figuring plans. It will save you hours of time. With your centre to centre width, it gives you the Hypotenuse and length, in an instant. You can take measurements from one inch to any length. It being circular and graduated on either side, makes it possible to give the largest range of measurements in the most compact form.
For 45-60-72 and 22½ Degree Fittings.

For sale by jobbers, hardware stores, and fine instrument dealers, or by sending the price to the Kolar Mfg. Co., 203 Adams St., Portland, Oregon, U.S.A. Use the scale 10 days and if not satisfied, return it and we will return your money. Over 3,000 sold. Not one ever returned. Made in two styles. Brass disc scale, $2.00; Celluloid Composition, $1.00.

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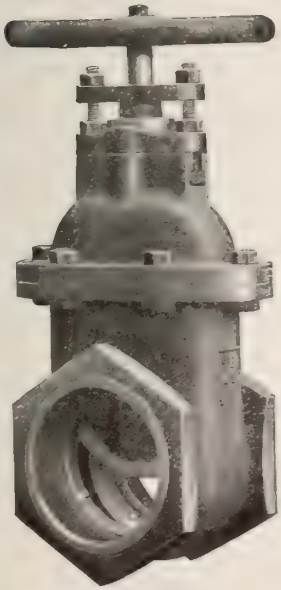


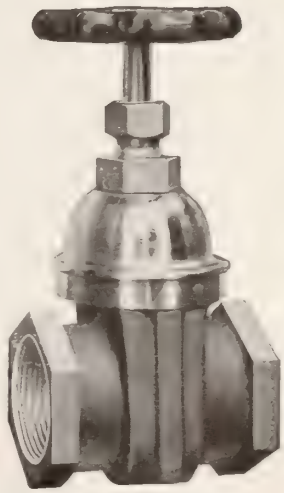
I. B. GATE

These Iron Body Gate Valves were designed and are made by US to meet YOUR demand for strong, substantial, interchangeable valves, with "nobby" appearance.

They meet the requirement and more. When they get us a customer they hold him.

Who in the Steamfitting trade has not heard of and used Kerr's (Weber) Brass Gate Valves? We say "Kerr's"—not the imitations. We make this valve of uniform material, and they stand up to the work given them, just as they always have. Some have tried others, but they came back to the tried and trusty old "Weber Gate" made by Kerr. What is a few cents on a valve, when you can get one like the genuine "Weber"?

Have you our Catalogue No. 5 ?
If not, we will mail you one.
A postal to-day will bring it.

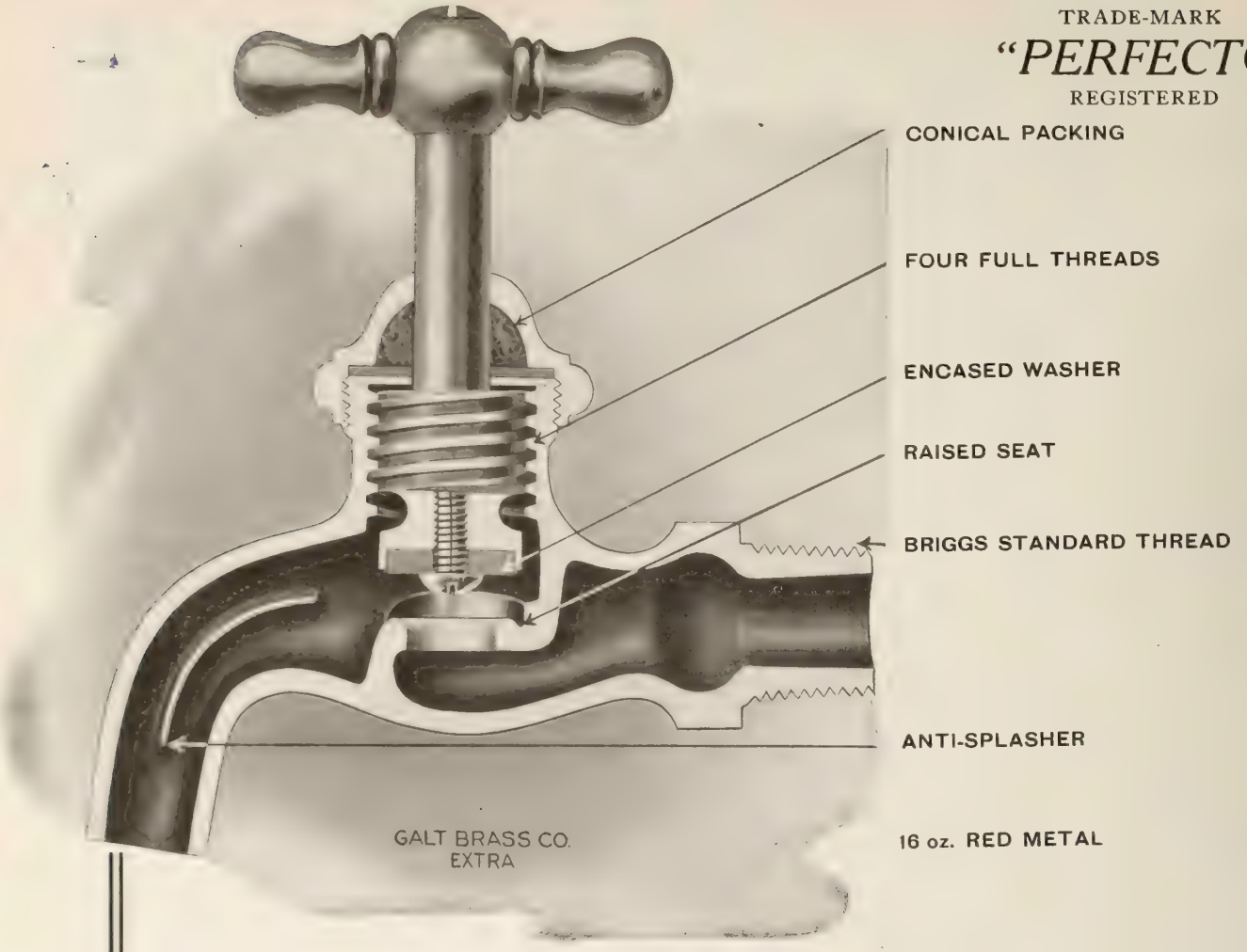


BRASS GATE

THE KERR ENGINE COMPANY, LIMITED

WALKERVILLE, ONTARIO

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. X Publication Office: TORONTO, OCTOBER 2, 1916 No. 19

FILE COPY

A1500

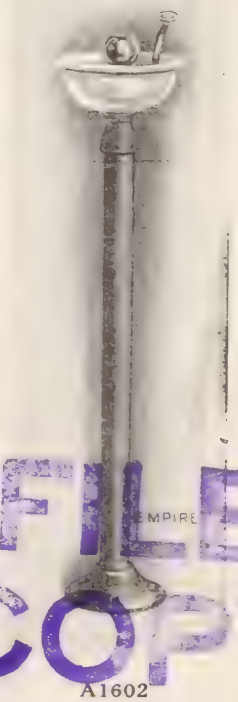
Empire Lavatories

We carry in stock a large assortment of Porcelain Basins; they are unexcelled in appearance and the quality is guaranteed.

These Lavatories, when installed, fitted with our high-grade brass goods, will make you satisfied customers. We give you the opportunity to supply your customer with a high-grade fixture at a reasonable cost.

Empire Drinking Fountains

We can supply a Drinking Fountain to suit all requirements.



A1602

The Fountain shown here has proven to be a favorite with the Plumbing Trade, as it is not only durable and pleasing in appearance, but the cost is reasonable.

Put one of these fixtures in your Show Room, it will attract trade.

Write us for prices.

Empire Mfg. Co., Limited

LONDON - - - TORONTO

FILE COPY

The Goods You'll Eventually Buy

Based upon a quality, second to none; you make no mistake in starting now to supply your customers with BEAVER BRAND White Enamel Ware

Ask your jobber for BEAVER BRAND CAST IRON ENAMEL WARE
and build up your reputation

EVERY DOLLAR WE OWN STANDS BEHIND THE GOODS WE MAKE

Amherst Foundry Co., Limited

General Offices and Factory: Amherst, Nova Scotia

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CANADIAN CONSOLIDATED RUBBER CO. LIMITED
DOMINION
RUBBER SYSTEM
AND ASSOCIATED COMPANIES

The Merchant who orders Fruit Jar Rings, the Contractor who requires Belting, the Architect who uses Tiling and Matting, or the Engineer whose Valves and Pipes need Washers and Packings, will always find the greatest satisfaction when selections are made from the Dominion Rubber System products, because,

THE QUALITY is dependable, and meets every possible requirement.

THE VARIETY is wide enough to meet every possible demand.

THE VALUE, no matter what the price or article, is the best within reach.

THE SERVICE is prompt and satisfactory, and there is no occasion for disappointment.

Back of all is the broad policy of the Dominion Rubber System to serve and please under all circumstances.

Write to our nearest Branch or direct to our Head Office for Catalogue and Prices.

Canadian Consolidated Rubber Co.
LIMITED

Head Office—Montreal, P. Q.

28 "Service" Branches Throughout Canada

The Burnham Boiler's Grates Shake Half-at-a-Time

Which just naturally makes them half again as easy to shake.

And it cuts down coal bills for the man that owns the boiler. Because during those mild days that come along in the early Fall and late Spring, when full fire would be too much for comfort, he can bank up the back half with ashes and run his fire on the front half, getting just the gentle heat that is actually needed—no more, no less—and burning just what coal that he actually needs to get it—no more, no less.

When you show a man how you can increase his comforts and decrease his coal costs you've got him half sold. The other half is easy.

There are some other keys to Burnham economy that you should know about. Our catalog tells about them all. Send for it.

Our friend is shaking the Burnham's grates half at a time, and pointing out the fact that the grates will dump the ashes to the front.

Lord & Burnham Co. Limited of Canada

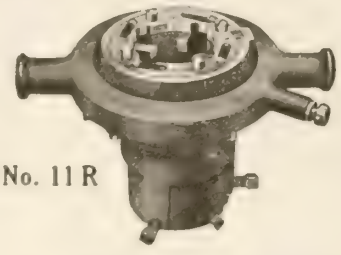
Builders of Greenhouses and Conservatories

(Boiler Department)

Royal Bank Bldg., TORONTO

Burnham Cosy Comfort Heat

Factory: ST. CATHARINES, ONT.



No. 11 R

"Jardine" Adjustable Ratchet-Threading Tool

Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely enclosed, excluding chips and dirt.

YOU CAN REDUCE THE LABOR OF PIPE THREADING 50 PER CENT., AND MAKE THREADS AS CLEAN AND PERFECT AS IF CUT ON A LATHE WITH ONLY ONE CUT WITH

"Jardine" and "Toledo" Pipe-Threading Tools

"Jardine" or "Toledo" dies spare the muscle of the man who does the work, and save money for the man who pays the wages, as they enable one man to do the work of two and costs less for repairs. No cams or jimcracks to wear and get out of order. Cutters that cut, don't squeeze. Set of cutters for each size of pipe. Lead screw ensures perfect pitch and form of threads. Adjustable to all variations of fittings, very durable cutters.

All threads finished at one cut. One man does the work of two.

It will pay you to look well into the merits of the "Jardine" and "Toledo" before placing your next order for tools of this kind.

Write for catalog and full particulars.

We'll gladly supply the names if you wish to have a chat with users in your town.

MADE IN CANADA

A. B. JARDINE & CO.

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Sole makers of "Jardine" Pipe-Threading Tools.
Sole licensees to manufacture and sell Toledo Pipe-Threading Tools in Canada.
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COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

Standard Sanitary Mfg. Co.
Limited

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PALACE OF THE KING OF THE BELGIANS
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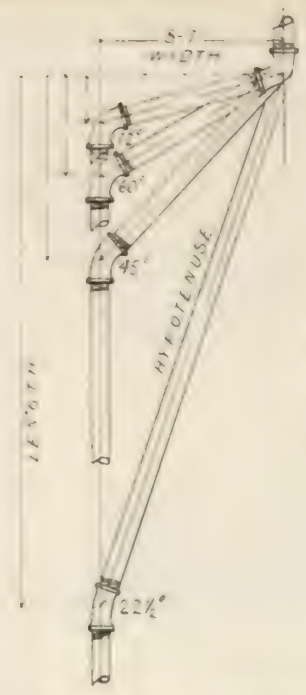

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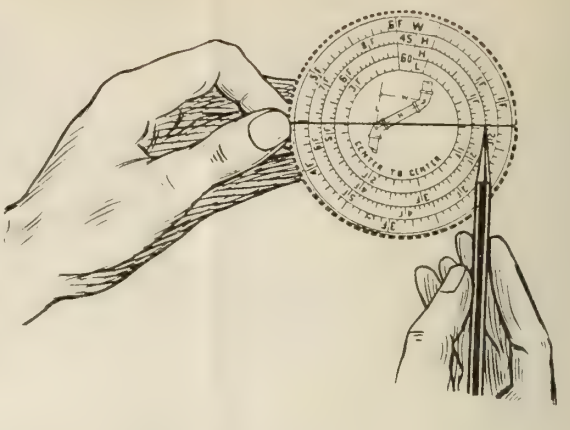
For Plumbers, Gas and Steam Fitters and any mechanic who has pipe angles to measure.

EASY — SIMPLE — CORRECT



Kolar's Scale is to assist mechanics, contractors and architects, in cutting angle pipe, making estimates, or figuring plans. It will save you hours of time. With your centre to centre width, it gives you the Hypotenuse and length, in an instant. You can take measurements from one inch to any length. It being circular and graduated on either side, makes it possible to give the largest range of measurements in the most compact form.
For 45-60-72 and 22½ Degree Fittings.

For sale by jobbers, hardware stores, and fine instrument dealers, or by sending the price to the Kolar Mfg. Co., 203 Adams St., Portland, Oregon, U.S.A. Use the scale 10 days and if not satisfied, return it and we will return your money. Over 3,000 sold. Not one ever returned. Made in two styles. Brass disc scale, $2.00; Celluloid Composition, $1.00.

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Simple—Safe—Economical—Common-sense Heating. Has all the advantages of hot water heating without the annoying features.

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TORONTO, CANADA

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With a set of patented "Q" valves providing unexcelled freedom of water discharge, and which can all be removed and replaced in twenty seconds—just a pair of pliers and one nut.

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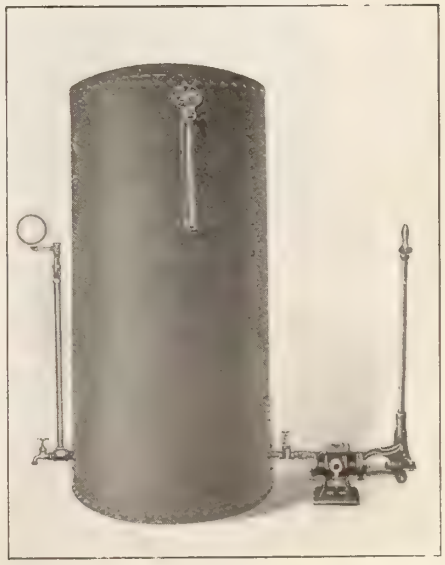
The easy operation of the No. 016 PEERLESS Hand Pump will astonish you. Try one. If you ship it back to us, we will send you a cheque for your money without a question.

"Q" Foot Valves Just Can't Leak



PEERLESS WATER SYSTEMS

MADE IN CANADA BY

Ask for Bulletin No. 65.

NATIONAL EQUIPMENT CO., LIMITED

TORONTO - - ONTARIO

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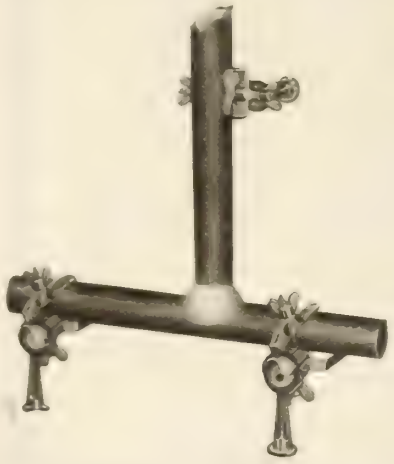
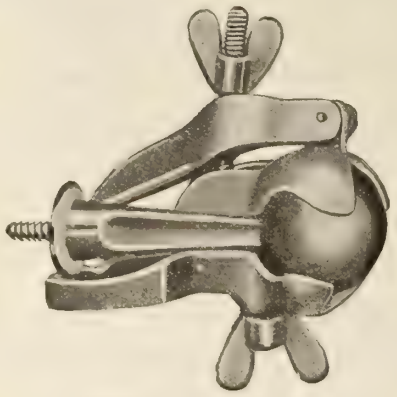
Cast Brass—Adjustable

Joint Wiping Reduced to a Minimum

"LITTLE JACK" has flexible ball joints and lock nut, therefore articles may be held in any desired position.



View showing how a Lead Pipe Tee Branch is held in place for the lead worker.



Folded for the Kit

1 Jack . - - $1.15 Net

1 Set (3 Jacks) - $3.00 Net

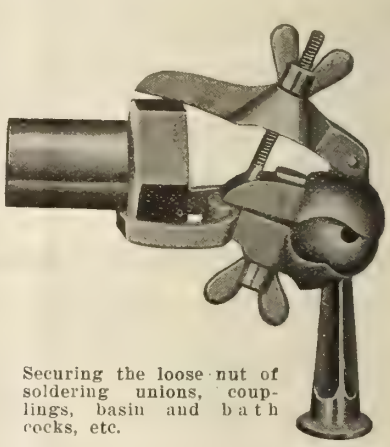
Postage 6 cents extra.

A PRACTICAL DEVICE

No Plumber Should Be Without

Send for a Set To-day

"LITTLE JACK" has a bulldog grip, but will not mar nor deface lead or nickel.



Securing the loose nut of soldering unions, couplings, basin and bath cocks, etc.

Canadian Wolverine Company, Limited

Manufacturers of Plumbers' Tools, Etc.

CHATHAM - ONTARIO

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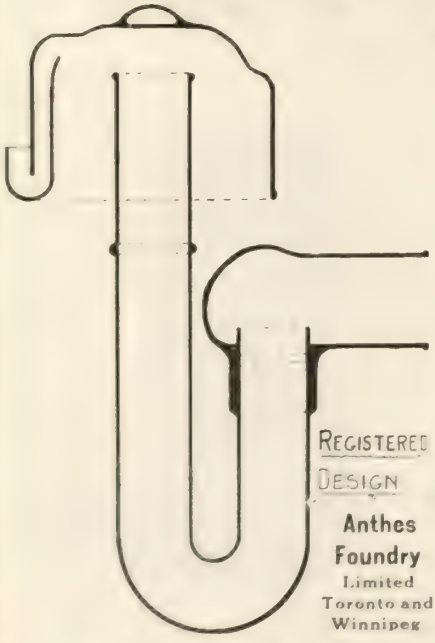
They're Different

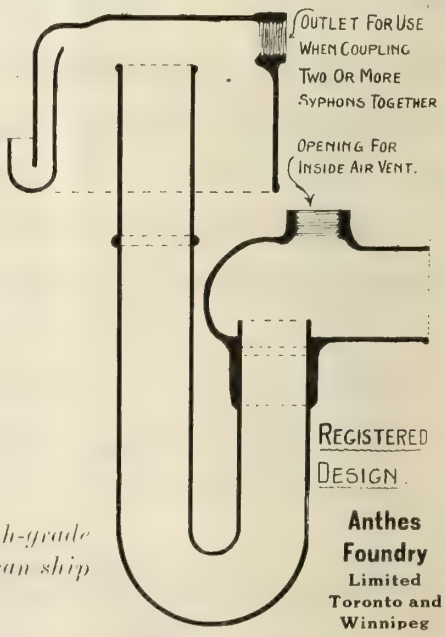


No. 1

IF you want any information on septic tanks for small sewage disposal systems, write us. Our syphons are unconditionally guaranteed to *operate* automatically.

OUR No. 2 syphon can be coupled to an existing one by merely changing the bell. The inside vent connection is very desirable where the temperature drops to a very low degree.

We manufacture a full line of high-grade cast iron soil pipe and fittings and can ship promptly from stock.



No. 2

Anthes Foundry Limited

TORONTO AND WINNIPEG

This Man is as Efficient as His File

and because he's a skilled mechanic, he prefers to work with one or other of the "Famous Five" Files.

He likes their balance. He appreciates the quality of the steel in them and the innumerable grades of Files he can obtain to fit the different kinds of work he has to do.

If you could take a vote among the men in your factory, you would find that they all know the "Famous Five" and prefer to work with them.

It is just as well to specify them when ordering.

The "Famous Five" Are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

(Made in Canada)

NICHOLSON FILE CO.
PORT HOPE
ONTARIO

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and TO OPERATE

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IF WE CAN assist you to make a sale, we are at your service at no cost to you. Send us a few names and we will protect your interest.

MADE IN CANADA

The United Electric Company
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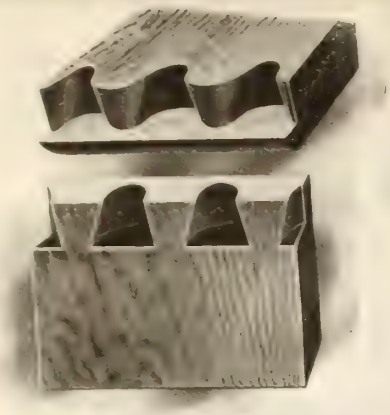

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TRADE B.O.T. MARK

It's Made Right. It Holds Tight.

WE DON'T know how to improve the B. O. T. line of W C. Tanks; if we did we would. Every joint is covered with a **5-year guarantee** backed by every dollar we own.

The only genuine wood, hidden lock dovetailed joint, W. C. Tank on the market.

The B-O-T Manufacturing Co., Limited

159-161 Richmond Street West, Toronto

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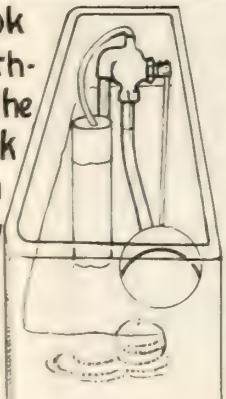

That's Why Leading Tank Manufacturers Jobbers and Plumbers Are Using More and More QUATURN SILENT BALL COCKS! A Fair Test Will Convince YOU of Rapid, SILENT FILLING! Post-Card Brings Prices!

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A Real Auxiliary Furnace Water Heater

Placed in an out-of-the-way corner of the furnace it will supply plenty of piping hot water for a 30-40 gallon tank at no extra cost, thus eliminating the use of your gas heater during the winter months.

Composed of eight fan shaped leaves over-lapping at their outer edges. No water way through the centre. A free unobstructed water travel. Nothing to get out of order. No baffle plates or dead arms.

Installed just above the fire—not in it.

Diameter 7 in.; height 3½ in.;

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Put up in a neat parcel post package.

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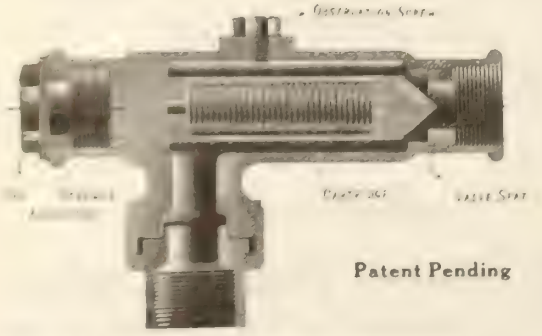

Patent Pending

The "WELO" Trap is guaranteed to pass air or water freely, but to shut off against steam.

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For High and Low Pressure Steam, Vacuum or Vapor Heating.

Made in Canada

BY

VICI RADIATOR COMPANY

HAMILTON, ONTARIO

THE DAISY BOILER

Over 60,000 in use

Made in 21 sizes, high or low base, heating from 167 sq. ft. of radiation to 4,000 sq. ft. May be built in batteries of any number or size.

We also manufacture

Viking Steam and Hot Water Boilers—

Viking Steam and Hot Water Radiators,

Cast Iron Flanged and Screwed Fittings,

—Soil Pipe and Fittings.

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Branch, 200 Adelaide St. West, Toronto **MONTREAL, P.Q.**

Don't Buy Pipe Wrenches! Buy Insurance!

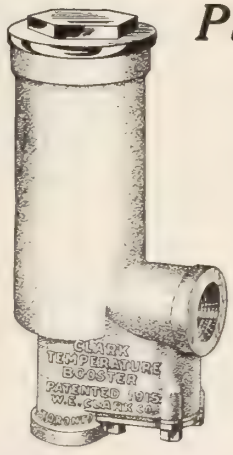
Williams' Improved "VULCAN" Chain Pipe Wrench,

lately awarded the P. P. I. E. Grand Prize, has double-ended reversible jaws, machine-tested chains and full chain contact which insure long life, complete safety and total absence of crushed pipe.

Your dealer will supply them in seven sizes that accommodate from ⅛ to 12 in. pipe.

J. H. WILLIAMS & CO.
77 RICHARDS STREET BROOKLYN, N.Y. CITY
THE WRENCH PEOPLE

Western Office and Warehouse, 40 So. Clinton St., Chicago, Ill.



Please Remember:

That the most satisfactory way to remedy a poor

HOT-WATER JOB

is to instal a

Clark Temperature Booster

This will increase the circulation and thus make the job efficient.

Your customer will be well pleased, and your reputation as a fitter will be greatly enhanced as a result.

TRY ONE OUT AND SEE

Made only by

W. E. CLARK, Limited

719 King Street West - - Toronto

SANITARY ENGINEER

PLUMBER AND STEAMFITTER OF CANADA

Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, OCTOBER 2, 1916 No. 19

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EDITORIALS

Buying Good Goods—Recent Exhibition—New Sheet Metal Course.

The MacLean Publishing Co., Limited

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EVERY FITTING TESTED

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The Tank of Sterling Worth

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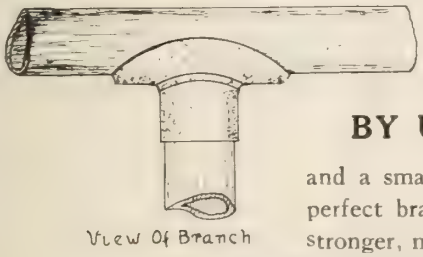
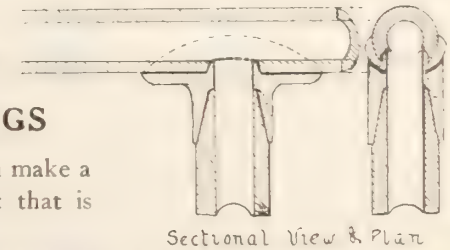


View Of Branch

The Scientific Metal Jointer



Sectional View & Plan

BY USING OUR LEAD FITTINGS

and a small piece of AMALGALINE, you can make a perfect branch in a scientific manner. A joint that is stronger, more durable and acid proof.

NOTE THE NEATNESS OF THIS BRANCH JOINT

It requires true skill to make this joint along with Amalgaline. Don't think for one moment that a botcher can do it.

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With Our Customers

A FRIEND of ours suggested that the new Company go after business in a new way, so as to create a greater demand for Port Hope enameled ware. He says that building operations may be quiet, but there is lots of opportunities to do business. The home owner in town and the prosperous farmer in the country are interested. They want new bath-rooms, and, if they only knew how easy they could got them and how little they cost every Plumber would be busy.

THIS is where the Plumber and Manufacturer could get together, and the Manufacturer is willing to help, but, Mr. Plumber, you will have to do the talking, and you won't be sorry if, when you are talking to your customer about new bath-rooms, or the latest type of enameled kitchen sink, you recommend the use of Port Hope Enameled Ware. It's high-grade and fully guaranteed, made in Canada, in an all Canadian factory.

The new Company will look after you, but be sure when you are placing your order with your jobber to ask for "Port Hope" Enameled Ware.

Port Hope Sanitary Manufacturing Co., Limited

FORMERLY

The Standard Ideal Co.

Head Office:
ROYAL BANK BUILDING, TORONTO

Works:
PORT HOPE, CANADA

Branches at Toronto, Montreal, Winnipeg and Vancouver

THE SANITARY ENGINEER

VOL. X. OCTOBER 2, 1916] No. 19

A Discussion on Credits and Discounts

Who Do, and Who Do Not Deserve Credit? — Opinions of Various Members of the Trade—A Move to Eliminate Undesirables from the Business or Make Better Business Men.

BY ONE OF US.

Article No. 3.

QUITE a number of letters have been sent us re the two previous articles that have appeared in The Sanitary Engineer under the above heading, all expressing a desire that the subject should be further discussed, and that good will surely come out of such discussion. No one more heartily wishes such a result than does the writer.

Credit Carries Responsibility.

What is credit? I doubt very much whether very many of us have really taken the question to heart just as seriously as we should. Only to-day, for instance, the writer happened to say to a friend, "Do you know if I had $5,000 to spare, I'd start up and make so and so.'" The friend immediately replied in true earnestness, "Well, I'll put up the "dough."

Just analyse that "dough," that "credit," and see what such a responsibility means. It means an obligation in money plus interest, plus possible failure of the venture. It means a $5,000 responsibility which may or may not ever be liquidated. And the reason why there is so much mismanagement on the part of sanitary and heating engineers is because they do not realize that the same bee which gives the honey has a "sting."

Its all very well to say, "I can get credit from so and so; why don't you see your way to give me a line of credit too?" But often the very creditor is using your brain, breath, and muscle to sell his goods. Whereas the one who holds you in check, who looks over your circumstances, and finds just how you can stand the credit, is your best friend. If the manufacturer or jobber always got his money and right to the day it was due, he could do business on a much less overhead expenditure. He would have to do less financing in many ways, and the goods he sells would cost less to produce. Further, the old saying, "Easy come, easy go," is the truest of business gospels. No position was ever worth while that did not carry its cost. No success was ever accomplished unless as a result of hard work, and it is next to impossible these days to build up a business for yourself on the other fellow's money or his goods.

Now do not for one moment think that credit is not desirable in the ordinary way. An order for goods is sent out, the goods arrive, and the payment is not due for 30 days; that is not credit if the goods are paid for at the due date. But if not, then the credit is not of a desirable nature, either for debtor or creditor. The former is having to find money in some way or other to meet his payments, and he will have to pay an interest on the money, or else find money which, if invested in some Government securities, would be paying a dividend. The creditor begins to be worried (if he has any conscience at all), he cannot do his regular day's duty as well as he should, and thus loses compound interest: his business becomes a bore, and so on to the end of the chapter. And all because of what? Simply owing to the failure to weigh carefully the responsibility involved when credit was accepted.

Then again, when responsible persons are given credit to the extent to which some have been given it in the plumbing trade, they do not realize what they are doing when they, in turn, give credit "easily," or cut prices to the core, or allow jobs to "hang fire" too long, thus not receiving a settlement in time to meet their own obligations. So let it be clearly understood that everything demands its price, and if the person receiving the goods does not pay for them, some one else surely does, and the man who pays his accounts regularly is in reality financing the person who in turn gives credit to "irresponsible deadbeats." The best suggestion, then, would be to buy from the fellows who sell for cash only, or its equivalent, viz. by demanding paying upon predetermined dates.

A traveller (I would not call him a "salesman") said to me when I "flew off the handle" about giving credit, "Why, Mr. ——, if that scheme of yours were put into practice, I'd never get an order in ten years." What a foolish statement to make? Such a man is not a salesman, and never will be. Anybody can give goods away. The only time when a sale is completed is when the goods are paid for. No man can call himself a business man or a salesman until the cash is in the till, and no contract is finished until paid for; that is the reason we have so many sanitary and heating engineers that are poor business men. They think when the mechanical part, the constructional work is finished that they've finished their work. It is not so, however, and that is the reason why most men who lack a business education make a failure in business, they lack the vision of responsibility; they are artisans, mechanics, etc., but need to be shown that every thing demands its price.

(Continued in Next Issue.)

TAP AND DIES DESCRIBED.

The "Gun" tap is the title of an attractive booklet recently issued by the Grennfield Tap and Die Corporation, Greenfield, Mass. The bulletin describes in detail the principal features of the "Gun" tap covering its design and operation accompanied by illustrations featuring the claims made for this tap.

Montreal Technical School and Its Equipment

In the Brief Space of Some Five Years Since its Establishment, the Montreal Technical School Has Amply Demonstrated its Worth as a Developer of our National, Commercial and Industrial Enterprise—A Recital of the Contributory Factors.

(Continued from Last Issue.)

Industrial Drawing

In keeping with the high standard maintained by all the other branches, that of mechanical and architectural drawing has yielded very encouraging results. The boys receive instruction from the simplest form of free hand sketching, on through the various sections of elementary geometry, projection and development of surfaces, and assembling the same from the free hand sketches previously taken. That the work is of the best, can be shown by referring to the line reproductions here shown of the work of some of the students, whose ages average around 16 years. The work showing the transverse section sketching from models and machines of a dwelling and the details of the Roman Corinthian were accomplished by a boy seventeen years of age.

During the third year, pupils are permitted if they so desire to make detail [illegible]

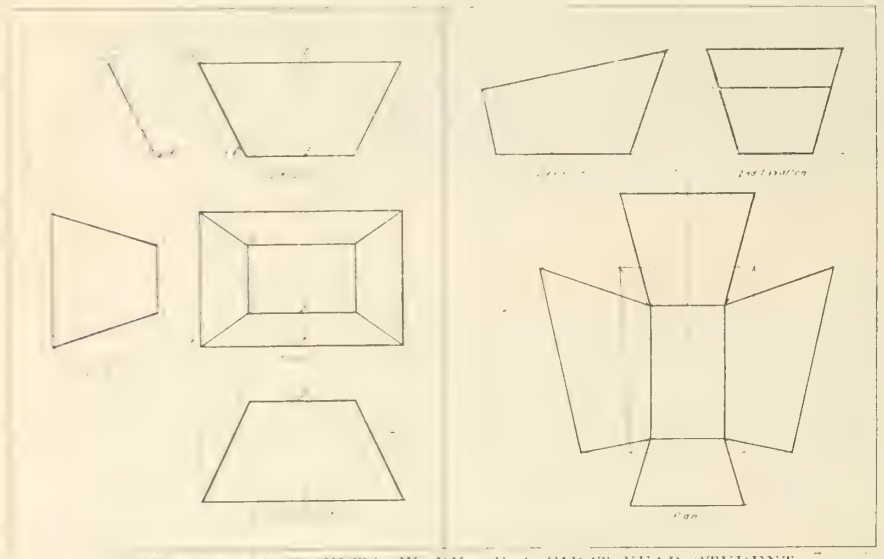


FIG. 15. RABATMENTS WORK OF A FIRST YEAR STUDENT.

Rules and Duration of Classes

This school offers day courses for regular students, from September to June, and night courses from October to March; the latter intended primarily for workmen and apprentices engaged during the day in the various manufacturing and building trades. As the school is not self-supporting a reasonable fee is charged for both the day and night classes; but in the case of boys wishing to take up a day course and not in a position to finance the same, provision is made whereby it is possible for almost any young man to receive the required tuition, at practically little or no expense.

The day courses are organized principally for the benefit of young men, who, having recently finished their primary or elementary studies, are anxious to acquire manual proficiency and the technical education necessary to become skilled mechanics, capable foremen or shop superintendents.

As the school is situated in the Province of Quebec where the population is largely French, the day courses are given in two languages, consequently the pupils are divided into two distinct groups, for class or theoretical instruction; but both sections are united for practical work in the various shops.

Both the theoretical and practical instruction are very thorough; the former covering arithmetic, algebra and trigonometry, elemental and descriptive geometry, general and industrial physics, electricity, general and applied mechanics, drawing in all its branches and industrial technology.

Unless a boy has definitely decided on a future course, the first year at the school is for the purpose of sifting out

FIG. 14. EXHIBIT OF STUDENTS' WORK.

the bent of each student for certain branches of engineering activity. While a young boy may feel he would like to take up a certain line of work, it is often found that his gifts and inclinations can be developed to far better advantage in some other direction.

While certain rules govern the course of the boys through the various classes, a reasonable amount of latitude is given to each pupil to develop his individual initiative. With this method it has often been found that a dormant mind has been awakened from a state of indifference to one of marked activity.

The normal duration of each course is three years, but those students who have passed satisfactory examinations and

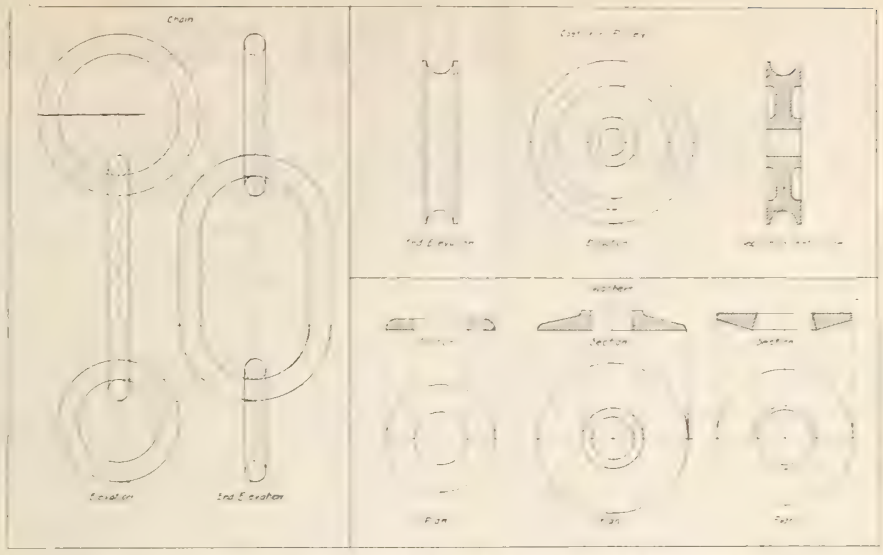


FIG. 16. PROJECTIONS—WORK OF A FIRST YEAR STUDENT.

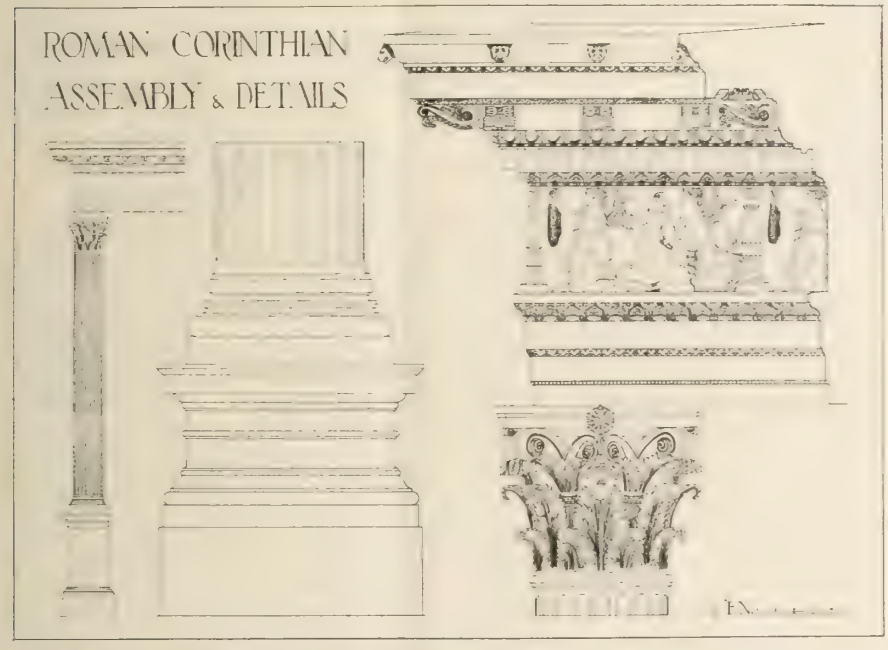


FIG. 18. DECORATIVE ORNAMENT—WORK OF THIRD YEAR STUDENT.

was constructed by the pupils, and when it is considered that the average age of these boys does not exceed sixteen years, the ultimate result of a few years training is very obvious. The work here exhibited surpasses, in many respects, that of a large number of journeymen mechanics now working at the various trades. A closer view of some of the work is shown in Fig. 4. The left hand panel contains some of the work of the first year pupils in foundry work, while the table display is that of second and third year students. The centre panel and the objects directly below illustrate some of the work perfomed by pupils in forging; while the work to the right is that of the oxy-acetylene department. In addition to the work here shown are several large show cases containing some of the finer work of the machine and electrical classes.

(Concluded.)

been granted diplomas, may, if they so desire, and are duly qualified, take an additional year in advanced work, or specialize in some one branch such as electricity, industrial drawing, automobile construction, etc.

Results of Instruction

It is very difficult to convey to our readers any definite conception of the achievement of the students, as it would be necessary for one to view the work at close range to fully appreciate the remarkable results obtained in the various branches of the school. However, some idea can be conveyed, to the uninitiated, by referring to Fig. 14, which illustrates a section of the exhibition hall. With the exception of the covers on the tables every visible object

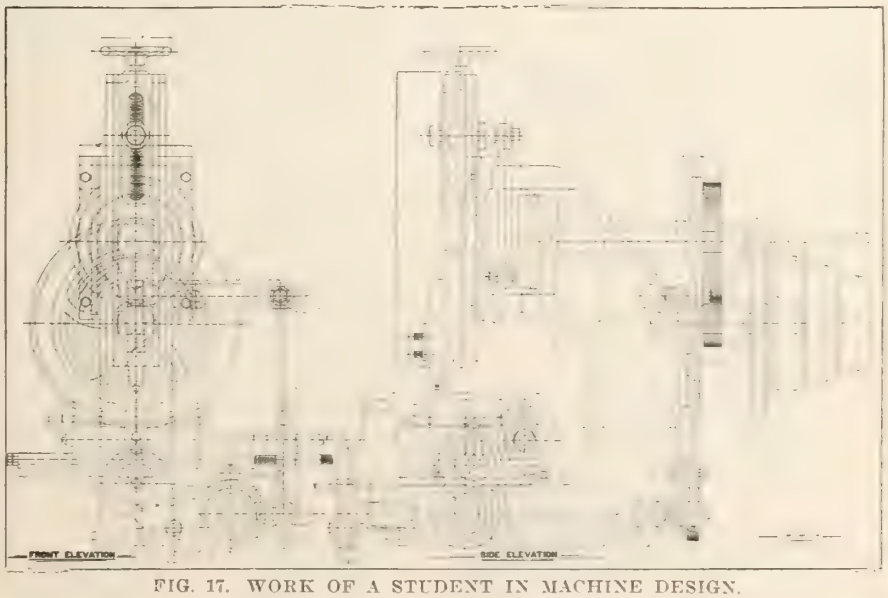


FIG. 17. WORK OF A STUDENT IN MACHINE DESIGN.

Rural Sanitation

A Continuation of the Sanitary Science Course That Has Been Appearing in the Sanitary Engineer, But Having Particular Reference to the Sanitary Disposal of Household Wastes in Unsewered Districts.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 11.

REFERRING to Fig. 39(c) of the previous Article 10, a Miller syphon was shown provided with a blow-off trap and a Harding vent. If each trap and vent are made in adjustable forms, the avg. water level in the tank can be altered within certain limits by the former, while adjusting the vent changes the low water level.

Before putting the syhpon into operation, the blow-off trap as well as the main trap, should be filled with water, but not the Harding vent. The operation has been described as follows:—

"The water rises in the dosing tank until the open end of the Harding vent is reached. The vent is thus filled and the syphon completely sealed. A further rise of water in the tank exerts a pressure upon the air confined within the syphon, and forces the column of water in the longleg of the main trap down toward the lower bend. The water in that part of the blow-off trap which extends up under the bell is also forced down, and when the discharge line in the tank is reached, the seal of the blow-off trap is forced, thus releasing the air confined in the syphon and bringing it into full operation. The water is drawn from the dosing tank down to the bottom bend of the Harding vent, the syphon is completely and instantly vented, the main trap and blow-off traps refilled, and the syphon is ready for the next operation."

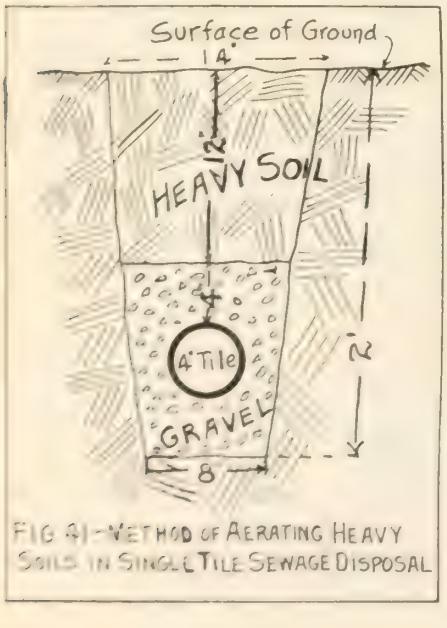


FIG 41-METHOD OF AERATING HEAVY SOILS IN SINGLE TILE SEWAGE DISPOSAL

For the Rhoads-Williams syphon shown in Fig. 40, the same principle of automatic blow-off is employed. Also the small pipe ABC, with the return bend at its lower end, as shown in Fig. 38, performs a similar function for the Merritt syphon.

There are many kinds of syphons. Frequently, also, two or more syphons are arranged to operate in turn with or without timing devices. But for small domestic sewage disposal plants the simple Miller types illustrated in Fig. 39 (c) and (d), and especially the former are by far the most popular. Such syphons are now manufactured in Canada and sold at reasonable prices.

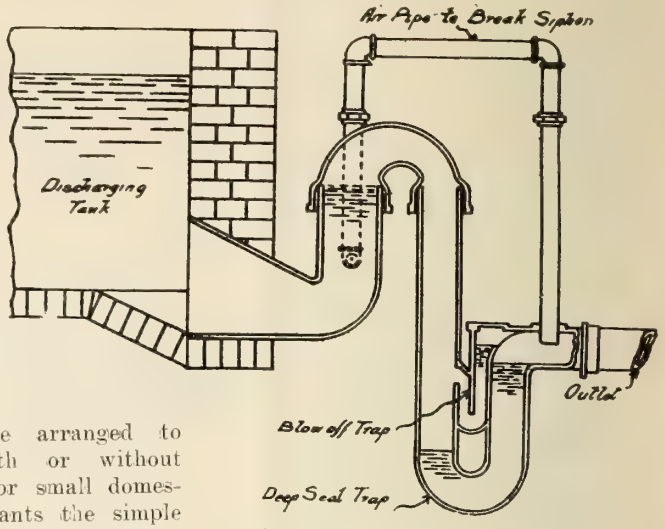


Fig 40—Rhoads-Williams Syphon

Syphons of the Miller and similar types fail if the entrapped air is expelled or leaks out, or is not drawn into the bell after each discharge. Instead of a full discharge a smaller and smaller stream flows until eventually the syphon acts only as a mere outlet. Sniff holes, blow-off traps, and other auxiliary devices, are liable to become clogged if there is much suspended matter in the sewage. In large sewage plants a regular inspection and cleaning of syphons is therefore made; in small domestic plants an occasional inspection of the syphon as well as of the whole plant is desirable.

Make-ups

A simple S-trap will operate as a syphon under the following conditions (which also apply to the Miller type):—

1. If the discharge end is lower than the receiving end.

2. If the discharge end is unconfined or means provided for the sewage to flow quickly away and the compressed air to escape, either into the air or back into the tank (see Fig. 39 (c)).

3. If a sniff hole is provided at the receiving end to take sufficient air after full discharge has ceased.

4. If the limbs of the trap are correctly proportioned.

(1) It is obvious that water can only flow from a higher to a lower level. In Fig. 39 (b), X is the difference in elevation or head when the syphon begins to flow, and Y is the head just as syphoning ceases. With this information, and knowing the diameter of the syphon trap, the average discharge per second or minute can be calculated.

(2), (3), and (4). A "made-up" syphon seldom conforms to conditions (2) and (3) and only approximately as to

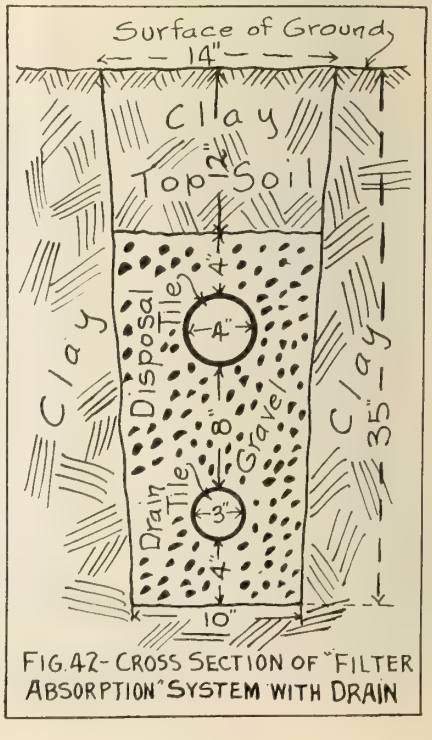


FIG. 42-CROSS SECTION OF "FILTER ABSORPTION" SYSTEM WITH DRAIN

(4). Consequently, many such "syphons" do not syphon at all or only for a few times. This is only to be expected when one considers the various difficulties outlined in this article that may be encountered even with a syphon scientifically designed.

From his own experience the writer is of the opinion that at the price for which cast iron syphons can now be purchased, it seldom, if ever, pays to make up one, especially of materials which will not as well withstand the action of sewage as cast iron.

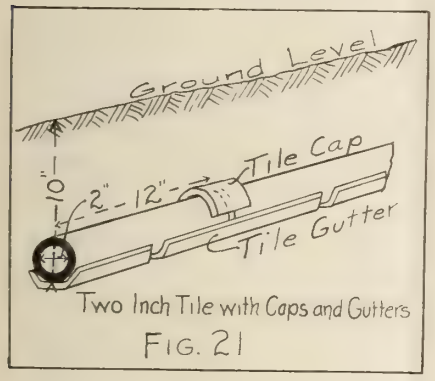


FIG. 21

Details of Sub-surface Irrigation Plants.

Some details of this class of sewage disposal plant have been already taken up in these articles, including such matters as the capacity of settling and flush tanks, syphons and their operation, and the size, shape and amount of the tile needed. There are other details that can best be emphasized as particular designs or plants are reviewed or criticized in future articles. There remains, however, some few details which can best be discussed in this article.

Depth of Tile Below Surface.

Fig. 5 which appeared in a previous article is reproduced here to show the distribution of soil bacteria under average conditions. The farther from the surface of the ground the less is the supply of air available for the bacteria which are necessary for sewage purification, and hence they are ordinarily found most abundantly within the first foot or so from the surface. Fig. 21 shows 2-inch tile placed in a trench of such a depth that the bottom of the tile is 10 inches below the surface. This agrees with Colonel Waring's original recommendation in the matter. Subsequent experience has proven, however, that larger tile must be used. A 4-inch tile placed in a 10 inch trench would have less than five inches of earth cover. To protect the tile from possible breakage, and also for other reasons, such as better protection, if needed, against frost, trenches are generally made from 12 to 18 inches deep and sometimes

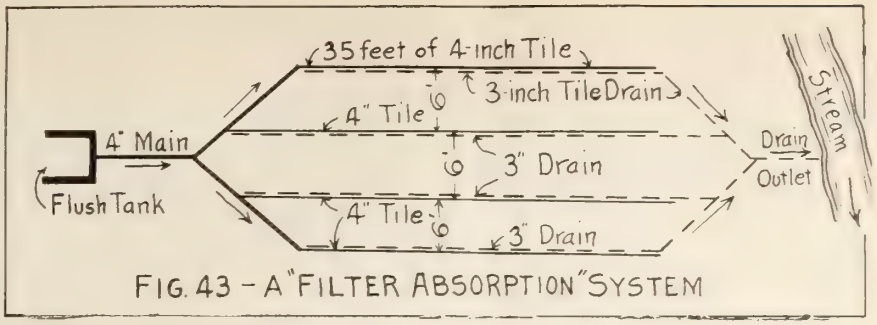
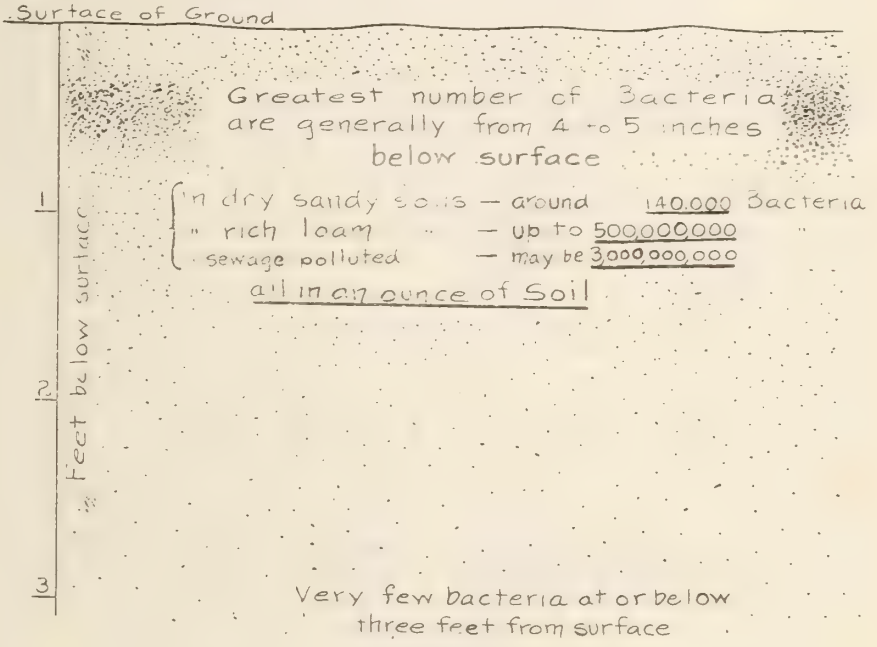


FIG. 43 – A "FILTER ABSORPTION" SYSTEM

greater, though this last is probably not such good practice.

From Fig. 5 it is seen that the bacteria naturally thrive best 4 or 5 inches below the surface. It is, for reasons mentioned, impracticable to place disposal tile at this shallow depth. However, the tile provide a means of bringing a certain amount of air to the soil if a vent is provided at the tank and especially if another vent is also placed at the end of the main. With air and food provided, bacteria can thrive well at any depth.

The preceding remarks are based on the assumption that the soil is sandy or a loam suited to such a method of sewage disposal. Where heavy or clay soils are encountered the conditions are not so favorable and different treatments may be necessary. In fact, there may be certain soil or drainage conditions


Surface of Ground
Greatest number of Bacteria are generally from 4 to 5 inches below surface
In dry sandy soils — around 140,000 Bacteria
" rich loam — up to 500,000,000 "
" sewage polluted — may be 3,000,000,000
all in an ounce of Soil
Feet below surface
1
2
3
Very few bacteria at or below three feet from surface
Fig. 5.

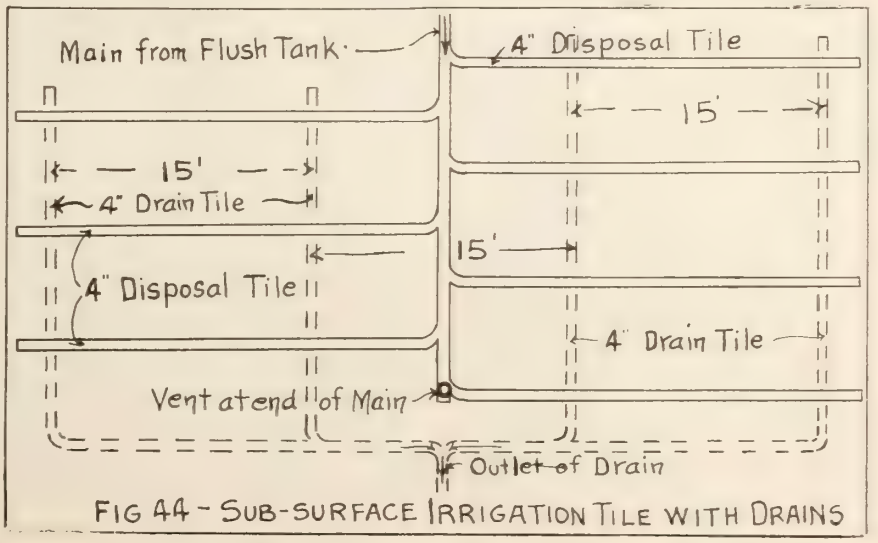


FIG 44 – SUB-SURFACE IRRIGATION TILE WITH DRAINS

water it would be very foolish to attempt to make use of the sub-surface irrigation of sewage disposal at all.

Fig. 41 shows a method that has been recommended for the aeration of heavy soils by placing a 12 to 16 inch layer of gravel or cinders in the bottom of a 2- foot trench.

Where there is no sub-surface drainage as in the case of impervious clay soil, artificial drainage is advised in a Bulletin of the United States Department of Agriculture by means of tile drains laid below the sewage tile in a trench of about three feet in depth (see Fig. 42). In Fig. 43 the dotted lines represent 3-inch tile drains, and it is

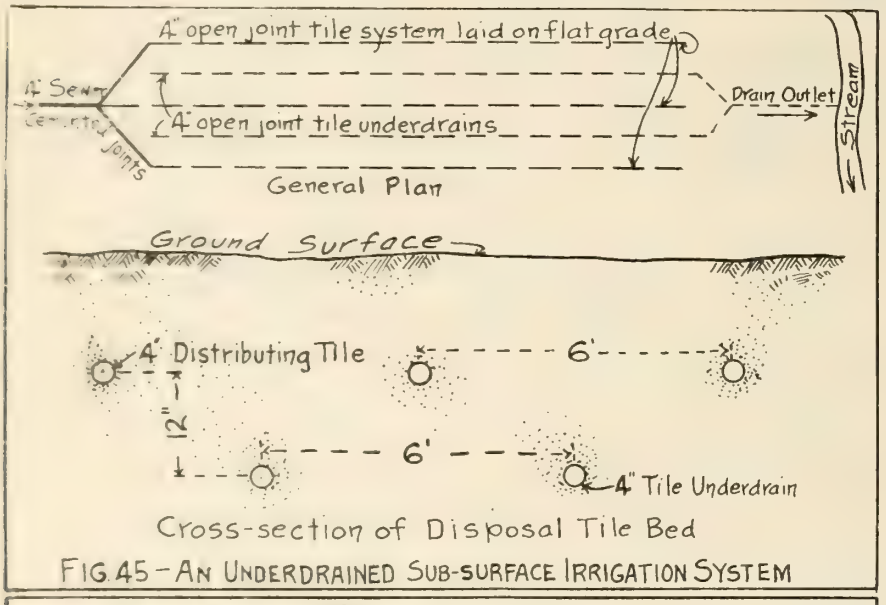


FIG. 45—AN UNDERDRAINED SUB-SURFACE IRRIGATION SYSTEM

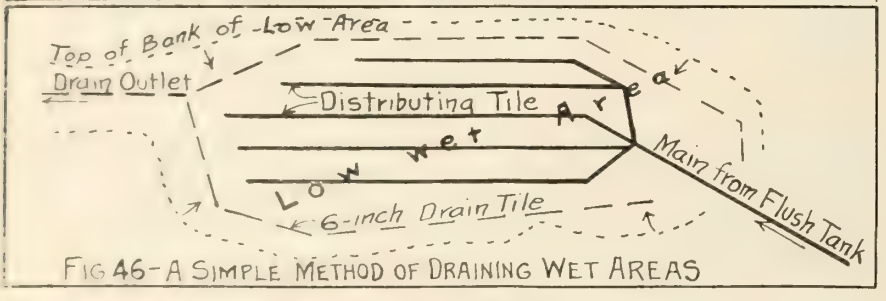


FIG. 46—A SIMPLE METHOD OF DRAINING WET AREAS

a "Filter Absorption System" might be laid out. It is apparent that the sewage must pass through at least eight inches of gravel before getting into the tile drain, and during this passage it is supposed to receive sufficient bacterial purification.

In many cases of soils needing drainage it is not necessary to go to what might be quite an extra expense of such a Filter Absorption System. The ordinary sub-surface tile system can be underdrained by 4-inch tile placed from 3 to 4 feet below the surface and spaced about 15 feet apart. A suggested arrangement for such an underdraining [illegible] of draining an area will suggest [illegible] the ground-water level in the bed. Fig. 46 illustrates the method suggested in a Sewage Disposal Bulletin of the Provincial Board of Health of Ontario for draining wet areas with a drain only around the outside of the disposal bed, but laid below the elevation of the tile.

Location of Disposal Area.

The ground selected for the tile disposal area should be free from shade and preferably a garden or lawn. Grass grows well over such absorption areas, and in summer evaporation from grass or other vegetation aids in freeing the soil of moisture. Cultivation of the ground should not, however, in any case be deep enough to disturb the tiles. There should be no trees or large plants near enough to the tile system to make it possible for roots to enter the tile at the open joints and clog the system.

Tile should not be placed under asphalt, cement or brick pavement or other hard surface, which would prevent thorough aeration of the soil.

Open Jointed Tile

The tiles generally used are common hard-burned agricultural drain tiles with an inside diameter of 3, or preferably 4, inches. They come in 12-inch lengths with plain square-cut ends. Tiles, if soft and porous in structure, will not last as long as those that are hard-burned.

When placed in the trench excavated to receive them, the tiles should be end to end with a space at the joints of from ⅛ to ¼ of an inch, the latter being the usual practice. It is through these open joints that the liquid sewage passes into the soil. These open joints must be protected to prevent earth or other foreign matter getting into the tile. Fig. 21 shows the method advocated in the early days of sub-surface irrigation by Col. Waring requiring both tile caps and gutters, both of which were a larger radius than the outside of the pipe. It is not usual now to employ gutters. But the joints are covered, and in some cases surrounded, with flat stones, tar paper, broken pieces of larger tile, coarse gravel, cinders, stiff sod, straw, or any porous material that will keep the earth from falling into the joints.

It is advisable to close the ends of each run of tile with a flat stone or cement to prevent rats, ground hogs, or other vermin, from getting into the tile system and clogging it.

The next article is to deal with the matter of grades at which mains from house to settling tank and from flush tank to disposal tile bed, should be laid and also to some extent with the layout of disposal tile when the area of ground available has an uneven surface.

It is then purposed to criticize in future articles certain designs or installations of sewage disposal plants in the light of facts and theories brought forward in this series of articles on Rural Sanitation. It is hoped that by such means the fundamental principles of sewage disposal will be firmly impressed on the reader. It is further hoped that in looking over illustrations of different plants some constructional features may appeal to the reader with problems to solve under conditions similar to those described.

(To be continued).

Toronto, Ont—The Gurney Foundry Co. will erect an addition to their plant on Junction Road at a cost of $2,500.

Data Relating to Heating Systems

The Time to Study Heating Systems and Their Requirements is When Such Installations are Being Installed — Many a Splendid System When Being Installed, Has Been Ruined on Account of There Being Very Little Grey Matter Used

By T. W. Reynolds

Article 4.

IN installations of hot water heating, the pipe should be well reamed out to remove the burr. The effect of burr is to reduce the area of the pipe, decrease the velocity and easy flow of the water. It is the cause of swirling water and eddies and increases the number of points at which sediment may lodge. Long turns should be used in order to avoid abrupt changes in the direction of the water flow. Valves on mains should be avoided, for, should these be closed while the boiler is in service, there would be no outlet for the expanding water. The volume of

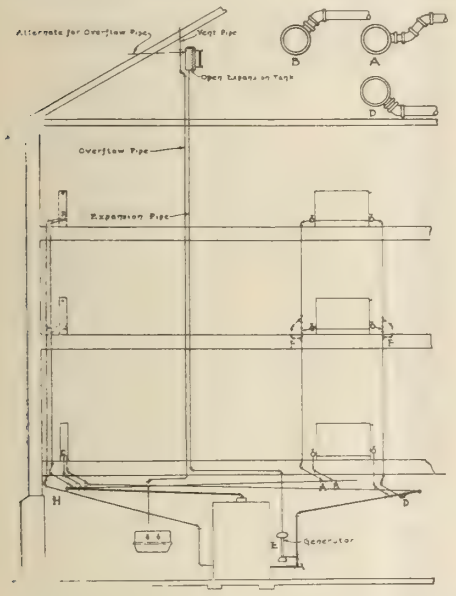


Fig. 7. Hot water two-pipe Pressure system.

water increases rapidly as it is heated, and, with the main valve closed and a new fire started under the boiler there would soon be disastrous results.

Turns and angles easily impede the free flow of water in hot water heating systems, such obstructions being more readily overcome in steam installations by the slight pressure usually present. The distance travelled by the water is also more of a hindrance than is the case with the flow of steam for an equal distance. In starting in with cold water in the boiler, circulation is more quickly effected in the hot water system, but the time in which the water reaches a temperature sufficient to be appreciable to the occupants of the building is much longer. It is equally slow in cooling off, which is a disadvantage when comfort and economy are considered. However, the temperature may be steadily maintained due to the amount of heat retained by the large quantity of water in the system. This acts as a reserve or fly wheel to balance fluctuations in the conditions of the fire. Again, the occupants of overheated rooms are inclined to raise the windows for relief from high temperatures, thereby increasing the coal consumption. This is usually the case when the ordinary steam system is employed for heating.

Range of Temperatures

With the hot water heating system the possible range of water temperatures is considerable and these may easily be varied in accordance with outside temperatures. The amount of radiation to be installed in any system of heating is usually figured to heat the rooms from a temperature of 10 deg. F. outside to 70 deg. F., the desired temperature of the room. When steam heating is used with outside temperatures above 10 deg. F., there is usually no economical means whereby overheating may be avoided. This is controlled in the hot water heating system by varying the water temperatures, but results in a higher relative humidity in the rooms heated.

Even when the rooms are not warmed above 70 deg. F., there is still a more uniform relative humidity in all parts, and this is not so apt to vary in accordance with the distance from the radiators, as in the steam system in which the radiating surfaces have a higher temperature. This higher relative humidity act favorably on the physical condition of the body. Certain organs of the body will more readily perform their bodily functions to promote our general health and physical comfort.

While the subject of ventilation will not be considered at length here, nevertheless it should be said in passing that proper control of temperature, humidity and air movement are necessary to the success of any ventilation system. Ventilation is generally employed in some form or manner in connection with the majority of heating systems.

Presure Hot Water Heating

Undoubtedly the simplest pressure type of hot water heating is best represented by the "Honeywell" method, Fig. 7 shows this diagramatically, but there are several specialities, however, in valves, etc., which are not shown. to old and poorly designed installations having undersized pipes in which the circuation is sluggish. The effect is to remedy such conditions by increasing the circulation and water temperature.

As the static pressure increases within any hot water system, the boiling point of the water is raised (roughly to 2¼ F. for each additional pound per sq. in. static pressure at the boiler). In tall buildings, this effect is gained

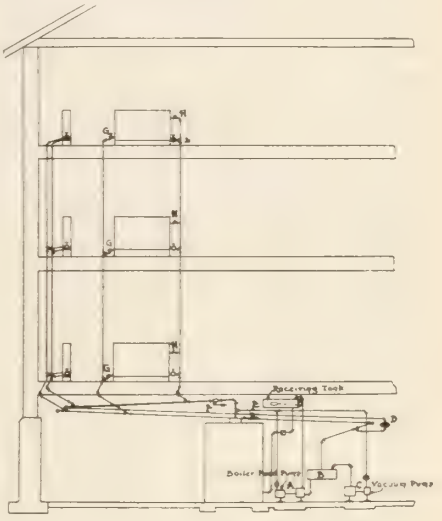


Fig. 8. Vacuum-steam mechanical vacuum system, type "A."

by the natural head or column of water from the boiler to the expapnsion tank near the roof. For ordinary sized buildings, however, the static pressure does not go much over ten or fifteen pounds per sq. in.

To bring about an additional head of twenty or thirty pounds per sq. in., a device called a "generator" is placed in the expansion line at some point E below the boiler and the expansion tank. This generator is simple in construction, resembling a barometer with an open top and overflow leading back to the cup of mercury at its base. Before the water can escape from the boiler into the expansion tank it is required to expand sufficiently to raise the

column of mercury in the inner tube of the generator.

Velocity of Flow. 6 6

Not only does this method of increasing the pressure within the hot water system make possible a wider range of temperature within the radiators, but

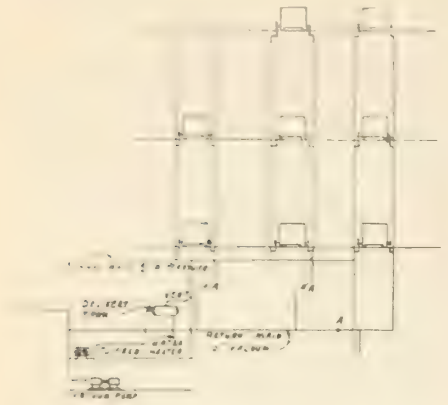


Fig. 9. Vacuum-steam mechanical vacuum system type "A." using special vacuum control valves

it also has the effect of materially increasing the velocities of the fluid throughout the system when the temperture is increased in the flow pipes. These two factors of the system give it an advantage over the open tank methods of hot water heating in that the radiators need not contain so much heating surface and the cross area of the feed and return pipes need not be so large. The range of temperature with the pressure method of hot water heating is very wide, being from 84 deg. F. to 240 deg. or more. This is favourable when compared with the low pressure steam system, which has a range of 212 deg. F. to 225 deg. F., and with the vacuum of vapor systems, which have a range of 150 deg. F. to 212 deg.

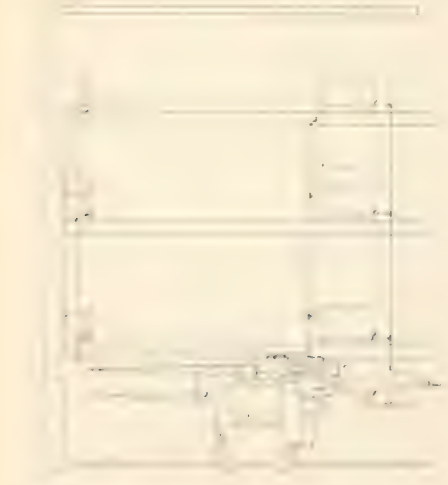



Fig. 10. Vacuum-steam mechanical vacuum system, type B.

Most of the schemes for piping in the Honeywell method can be made use of in any hot water installation. The purpose of the schemes used is to properly proportion the system and get a balanced distribution of the heat to all parts of the building. Referring to H (Fig. 7), it will be noted that the first radiator taken off from the main has its return carried back to the boiler independently, otherwise the rapid circulation through this nearest unit would tend to slow up the circulation of the colder water from the units beyond. It is advisable in many cases to carry the returns from the first three or four units, which are supplied back to the heater independent of the return line. Branches from the mains where reductions are made should be connected for the relief of air through the radiators they serve, otherwise the effective area of the larger pipe would be no greater than that of the smaller. Separate branches to each unit will allow of a better control.

Pipe Size References.

If a $1\frac{1}{4}$ in. main be used, starting at the boiler, never reduce it, but extend full size to the end. If a $1\frac{1}{2}$ in. main be used from the boiler, it may be reduced one size (to $1\frac{1}{4}$ in.), but not smaller, and should be extended full size to the heel of the connection leading to the last radiator on the main. It is best, however, to extend a $1\frac{1}{2}$ in. main full size to the end; this will obviate the use of a B connection and separate returns to prevent the possibility of short circulating.

"Never attempt to connect a one-inch riser to a second (or higher) floor to a $1\frac{1}{4}$ in. main; a $1\frac{1}{4}$ in. riser to a $1\frac{1}{2}$ in. main, nor a $1\frac{1}{2}$ in. riser to a 2 in. main. It cannot be done successfully The size of the main should always exceed the size of the riser at least two commercial pipe sizes.

"To secure a high velocity and even distribution of the water throughout the system, mains having a diameter of $1\frac{1}{2}$ in., 2 in., and $2\frac{1}{2}$in. should not be reduced more than one size after leaving the boiler. Example—A $2\frac{1}{2}$ in. main starting from the boiler should end 2 in. in the last first floor radiator. Neglect of this advice invites all the sluggishness and likelihood of short circuiting."

Hot water boiler ratings are usually based on a warm temperature of 165 deg. F.; for this reason the boiler selected for a pressure system should have the same capacity as one chosen for an open tank installation, notwithstanding the lesser amount of radiation used in connection with the former system. Steam boiler ratings are generally preferred, as the water must be heated to a higher temperatpure.

Vacuum Steam Heating

There are something over seventy-five vacuum or vapor systems on the market at the present time. It is believed that of all these "patented systems," only three general types exist—two of which may be called "Mechanical Vacuum" systems (see Figs 8, 9 and 10), and one of which may be called a "Self-induced Vacuum-vapor" system (see Fig. 11).

The type, a mechanical vacuum system (Fig. 8), is essentially a low pressure two-pipe steam installation, having a vacuum pump C at the end of the return to create and maintain a partial vacuum of 5 or 10 inches on the system, and a pump A to care for the condensation and return it thruogh a receiving tank E to the boiler. In this system, high boiler pressures are required to operate boiler feed and vacuum pumps. Where steam is used only for heating

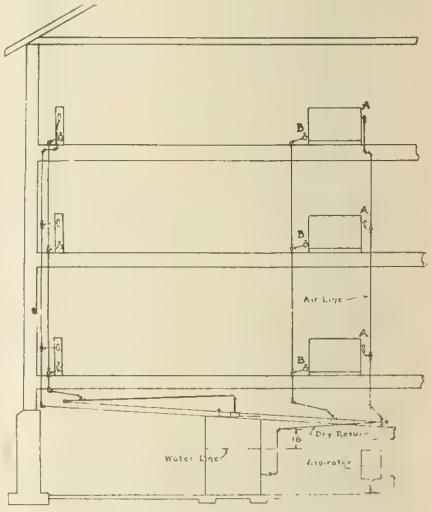


Fig. 11. Self-induced vacuum vapor system.

purposes, such pressures may be avoided by using electrically-driven pumps.

Medium Pressure Service

It is often desirable to have a medium pressure service boiler, in which case it becomes necessary to place a pressure reducing valve F in the heating main, which reduces the pressure of the steam from the boiler to atmospheric or lower pressure. The supply risers are connected to the radiators with either "thermo-control" valves or ordinary valves of the packless type. Better results are obtained by connecting the steam supply at the top of the radiator, as shown by H (Fig. 8), in which case it is better to use the hot water type of radiator. This allows the modulating valve to be located hand-high.

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VOL. X. OCTOBER 2, 1916 No. 19

BUYING GOOD GOODS

THE recent exhibitions held in Toronto and London were not only demonstrations of what we can make in Canada, what is being made in Canada, but also what is being bought in Canada. No commodity was specially gotten up for show, but everything was, so to speak, "right off the shelf." Such being the case these exhibitions prove beyond doubt that "price" is not altogether supreme, but rather that quality is the keynote of the demands being made upon the manufacturer by the consumer.

Now, under these conditions, quality and service should be the keynote of every sanitary and heating engineer.

Quality goods and quality installations that will render maximum service will always command a price which will justify the charge, and no doubt the person who builds, who sells or who installs for the sake of "getting the job" and then is forced to cut down on quality, nine times out of ten makes a botch of the work and spoils the chances of a better man putting in a better job and procuring a better price.

The public are losing faith in the man who professes he can "save you money" or "buy from the manufacturers," etc. Every job demands its price some time or other, if not in the initial cost, later on it will and with interest and the fact that every year sees a higher quality of goods on exhibit, proves that the public want something better and are willing to pay for it. Don't install a cheap job when you know that it will not give maximum service.

THE CUP AND THE PLATTER

ABOVE is the title of a short article which appears on another page, the reading of which is certainly "worth while."

The *Kingston British Whig*, in which the article originated, appears to question the expediency of enforcing owners to cut up their small rooms so as to install sanitary plumbing, while at the same time allowing insanitary plumbing to exist in larger houses or buildings in which there is lots of room to remodel and make sanitary.

There is some sound thought in the *British Whig's* query, which should be given more light. Any incompetent person with a little pull and less time can procure positions as inspectors, and old plumbing even can be also so-called "improved" when oftener than not the piping under floors, etc., is left in a filthy state. Repairs are made by the thousand which do not conform to sanitary plumbing by-laws and little or any effort is made to remedy matters. All plumbing should be inspected every year by competent men and if work has been done between the two periods in which it has been inspected and that work is not in accordance with the existing plumbing by-law, those who are responsible for the repairs should be fined heavily, and those doing the work should have their license cancelled.

Many a bathroom has been re-modelled by having new fixtures installed, but like cleaning "the outside of the cup and the platter," the piping and traps are filthy and not fit to connect up-to-date fixtures to.

It is refreshing to see once in a while a daily paper take a reasonable interest in such matters, and the Kingston *British Whig* is to be complimented in many instances for taking note of things worth while.

NEW SHEET METAL COURSE

THE interest shown and inquiries received in connection with the sheet metal course, the last article of which appeared in a recent issue of THE SANITARY ENGINEER has resulted in our securing another course a little differnt to the last one.

It will prove much more interesting than the last and will treat upon subjects not mentioned to our knowledge in any previous course and in a slightly different way. Of course many of the articles will be very similar, but in spite of that, when described by a different author they will very often have more interest for some readers.

The first of this series appears on another page in this issue.

One outstanding feature in this course is that every article is written complete in itself which adds considerably to the value of such a course.

SHED a tear; booze has gone. But get up and smile. It means millions devoted to other purposes.

* * *

CONSTANTINE, King of Greece, it is suggested, is "beside himself." He must be or he would be beside the Allies.

* * *

WE ARE exporting less pulpwood now than at any time in the last five years, but are still shipping the raw material at the rate of about six million dollars a year. The export of wood should be stopped. It should, before being exported, be made into the highest grades of paper in Canadian mills by Canadian workmen who buy Canadian-made clothing and luxuries in their local stores.—THE FINANCIAL POST.

New Canadian Patents

No. 166946

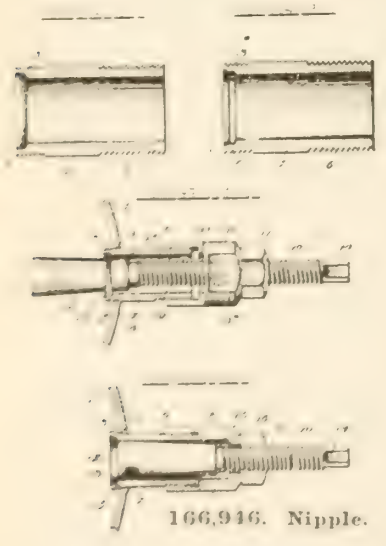
The H. Mueller Manufacturing Company, assignee of Philip Mueller, both of Decatur, Illinois, U. S. A., 4th January, 1916; 6 years. Filed 28th October, 1915. Receipt No. 257,438.

Claim.—1. A tubular fitting of uniform exterior diameter throughout its length, screw-threaded on one end for engagement into and through a support, and provided with an interior annular ring seat coincident with such end and being located wholly within the support.

2. A tubular fitting of uniform exterior diameter throughout its length having a screw-threaded end for engagement into and through a support, and having an interior annular flaring mouth ring seat coincident with such end beyond the support.

3. A tubular fitting of uniform exterior diameter throughout its length having screw threads on one end for engagement into a support, and having an interior annular ring seat at said end located wholly within the support and formed by reducing from within the thickness of the end wall of the fitting.

4. A tubular fitting of uniform exterior diameter adapted for insertion at one end into and beyond a support, and an anchoring ring wedged into said end



166,946. Nipple.

of the fitting beyond the support whereby the said end of the fitting is expanded position and retain the fitting in the support.

5. An apparatus for expanding a fitting having at one end a ring seat, said apparatus comprising a sleeve adapted to be threaded on said fitting, a ring expanding tool, the expanding end of which is a wedge, a ring adapted to be seated in the ring seat of said fitting, and a threaded stem passing freely through the fitting and sleeve, and tool manipulator threaded on said stem.

6. An apparatus for expanding a fitting having at one end a ring seat, said apparatus comprising a ring expanding tool, the expanding end of which is a wedge, its other end comprising a threaded stem adapted to pass through said fitting, a ring on said wedge to enter and be expanded in said ring seat, and a tool manipulator threaded on said stem.

7. In combination a wedge anchoring tool carrying an expanding ring adapted to enter a ring seat in one end of a fitting and expand the same, and means for operating said tool to expand said tool to expand said ring and through said ring the end of the fitting.

8. An apparatus for expanding a fitting having at one end a ring seat with thinner walls than the rest of said fitting, said apparatus comprising a ring expanding tool carrying a ring adapted to be seated in the ring seat of said fitting, a gasket arranged to surround said fitting, means adapted to be carried by said fitting for compressing said gasket, and means for manipulating said ring expanding tool.

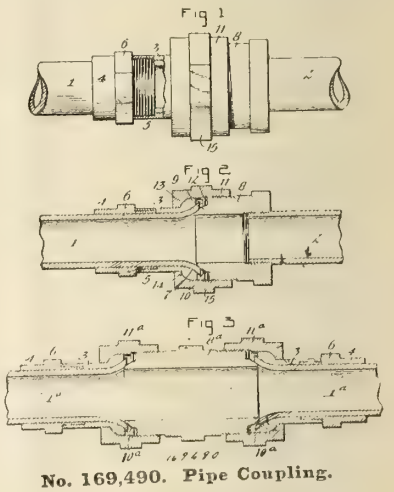
9. An apparatus for securing a fitting in place having at one end a ring seat formed by reducing the thickness of the walls of said fitting, said apparatus including a ring expanding tool carrying a ring designed to enter the ring seat in said fitting, a gasket arranged to surround said fitting saddle adapted to bear on said gasket, and means for engaging and moving said saddle to compress said gasket.

10. An apparatus for anchoring an exteriorly threaded fitting screwed at one end into a support and having a bore enlarged at its inserted end to form a seat, said apparatus comprising an expanding tool adapted to be inserted within said bore formed of a threaded stem terminating at one end in an outwardly tapering head, an expansible ring for loose mounting on the smaller inner end of said head to enter said seat when the tool is inserted in the fitting, a sleeve slidable on the threaded stem formed with an internal thread to screw on the projecting end of the fitting, and a manipulator threaded on said stem which on being revolved bears on said sleeve and drawing the expanding tool through the ring and nipple, expands the ring and by means of the ring expands the inner end of the nipple.

No. 169,490

Peter G. Sigrist, assigner of George Ziegler, both of Buffalo, New York, U.S.A., 16th May, 1916; 6 years. Filed 11th March, 1916. Receipt No. 262,736.

Claim.—1. A pipe coupling comprising a sleeve having a flaring bore



No. 169,490. Pipe Coupling.

adapted to receive the corresponding end of a soft metal pipe, said sleeve consisting of separable front and rear sections, the front section having an external shoulder and the rear section having a flat sided collar, a thimble having a nipple adapted to enter the flaring end of the soft metal pipe, and a coupling collar engaging said thimble and the shoulder of said sleeve section.

2. A pipe coupling comprising a sleeve having a flaring bore adapted to receive the corresponding end of a soft metal pipe, said sleeve consisting of separable front and rear sections connected by a left hand screw thread, the front section of said sleeve having an external shoulder and the rear section having a flat sided collar, a thimble having a nipple adapted to enter the flaring end of the soft metal pipe, and a coupling collar engaging the shoulder of said sleeve section and connected with said thimble by a right hand thread.

No. 169,543

Harold Jarvis, Toronto, Ontario, Canada, 16th May, 1916; 6 years. Filed 26th January, 1916. Receipt No. 260,521.

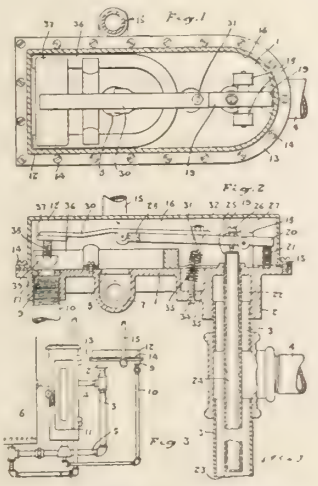
Claim.—1. In a thermostatic controller for gas water heaters, the combination with a gas supply and a heater, of a valve adapted to close the gas passage to the heater, a magnet armature connected to said valve, a fixed magnet adapted to attract said armature to hold the valve closed, a thermostat adapted to control the opening and closing of the valve, and a spring tension means interposed between the thermostat and the valve to effect the quick opening and closing of the valve.

2. In a thermostatic controller for gas water heaters, the combination with a gas supply and a heater, of a valve adapted to close the gas passage to the heater, a pivotal arm supporting said valve and having a break joint intermediate of its length, a fixed magnet, an armature carried on said arm adapted to co-operate with said magnet, a tension spring holding said break joint, and a thermostat adapted to operate said arm to open and close the valve.

4. In a thermostatic controller for gas water heaters, the combination with a gas supply and a heater, of a valve adapted to close the gas passage to the heater, a lever pivotally supported adjacent to one end, a thermostat controlled by the heater and engaging said lever to swing it upon its pivot, an arm pivotally mounted on said lever and having one end spring held in contact with said lever, a valve mounted on the outer end of said pivotal arm adapted to close the gas passage to the heater, a magnet armature secured to the outer end of said pivotal arm, and a fixed magnet arranged to co-act with said armature to attract the same to close the valve.

4. In a thermostatic controller for gas water heaters, the combination with a gas supply and a heater, of a valve chamber interposed in the gas supply, a valve seat arranged at the outlet from said valve chamber, a lever pivotally mounted within said valve chamber, an arm mounted intermediate of its length at one end of said lever, a valve at the outer end of said arm adapted to engage said valve seat to prevent the outflow of gas to the heater, a thermostat adapted to engage said lever between the pivot and the outer end supporting the valve arm and adapted to raise and lower said arm to open and close the gas passage, a magnet arranged adjacent to the outer end of the valve supporting arm, an armature carried on said arm adapted to co-operate with said magnet to hold the valve in its closed position, and a tension spring secured in the valve chamber and adjustably connected to the end of the valve arm at the end opposite to and carrying the valve.

5. In a thermostatic controller for gas water heaters, the combination with a gas supply and a heater, of a valve chamber interposed in the gas supply, a valve seat arranged at the outlet from said valve chamber, a lever pivotally mounted within said chamber, an arm mounted intermediate of its length on one end of said lever, a valve at the outer end of said arm adapted to engage said valve seat to prevent the outflow of gas to the heater, a carbon stick thermostat supported from said valve chamber and extending there within and engaging the valve operating lever between the pivot and the valve, a spiral compression spring engaging an extension from the lever and holding said lever in constant engagement with said thermostat, an adjustable contact means between said lever and said thermostat, a magnet armature carried by the valve supporting arm on its outer end, a magnet adapted to co-act with said armature to hold the valve to its seat, and a tension spring connected to the inner end of said valve supporting arm.



No. 169,543. Thermostatic Water Heaters.
Controller for Gas

6. In a thermostatic controller for gas water heaters, the combination with a gas supply, a water reservoir and heater, of a thermostat arranged within the water circulating pipes outside of the reservoir, a valve adapted to close the gas passage to the heater, spring tension means supporting said valve and operatively engaging the thermostat a magnet armature carried by said spring tension means supporting said valve, and a magnet adapted to co-act with said armature to effect a snap closing and opening of the valve.

7. In a thermostatic controller for gas water heaters, the combination with a gas supply, water reservoir and heater, of water circulating pipes arranged between the heater and the reservoir, a thermostat arranged in said water circulating pipes outside of the reservoir, a gas valve chamber arranged at the outer end of said thermostat, a valve arranged in said chamber adapted to close the gas passage to the heater, a member supporting said gas valve and operatively engaging said thermostat, and spring means adapted to co-act with said valve supporting means and the thermostat to effect the quick closing and opening of the valve.

EVERY MAN TO HIS OWN TRADE

by R. J. M.

There are very few men who have not, at some time, been placed in a position of humility, on finding they were forced to reliquish a task they had at first considered as very simple. It seems to be a trait of human nature to think itself capable of performing certain tasks, as well, if not better than the other fellow, who in many instances has spent several years of his life in acquiring the necessary knowledge for the successful accomplishment of his allotted duties .

Among the many foolish things I have seen done by men who really ought to have known better even though they were not experts in that line was that of a preacher, who anticipated, without much trouble, making a joint in a water pipe connection. Having obtained an ordinary flat faced union and a quantity of red lead from an engineer next door, he started in to do the "little" job. A few hours later, the engineer was called in for advice, to find the preacher covered from head to foot with red lead and perspiring freely in an effort to stop the joint from leaking. The engineer looked at the job, shut the water off, released the union with great difficulty, as the other had been using brute strength (pardon the expression) in trying to get a tight joint, inserted a rubber gasket, replaced the nut, and when the water was turned on, no leak was evident. The preacher thanked the engineer, but what was said before his appearance is not recorded.

Commenting upon that "preachers's job" suppose that preacher had been furnished with a Dart Union, bronze to branze, what then It would not of course have proved that he knew the "job" any better, but rather that he had unconsciously gotten the right article in the right place.—Editor.

Hydro-Pneumatic Hand Pumps and Air Compressors

What an Air Compressor is Required For—When and Where Not Practical—Written as the Result of a Number of Inquiries Made on the Subject.

By "One of Us."

In these days when the hydro-pneumatic system of supplying water in rural homes and institutions is becoming more and more popular, it behooves the members of the trade to familiarize themselves with the simple details of their construction, so that, understanding the principles involved, they may not only be able to satisfy themselves regarding the merit of the claims put forward by various manufacturers, but also to discuss the question intelligently and convincingly with prospective customers.

As everyone knows, and the very name of the system implies, water is forced from a tank in the basement, or other suitable position, by compressed air—the air in the tank in the first place, and air which must be replenished, that has been absorbed by water under pressure—and the object of this article is to discuss the best means of renewing this air in the tank, as, from time to time, such action becomes necessary. Most of the pump used is operated by hand, this not affecting the question directly, as is the case with motor-driven pumps.

The history of the hydro-pneumatic system shows that in the first instance a [illegible] pump was used in addition to the water pump, and in at least one important respect it was [illegible] the compressor, [illegible] supplied to most complete [illegible]

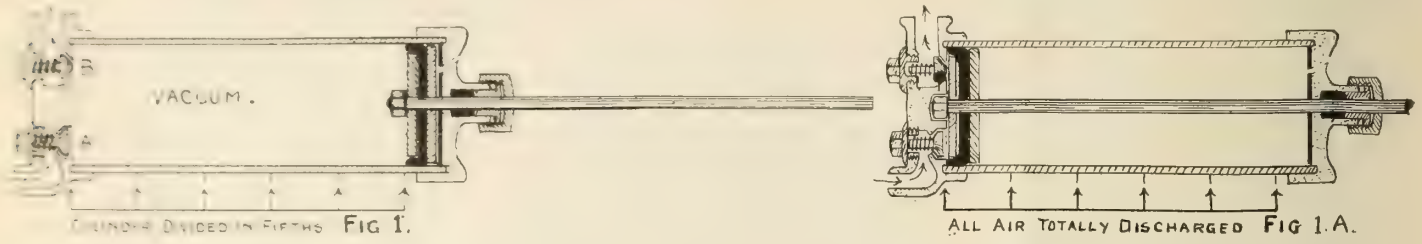


FIG 1.

FIG 1.A.

strange, particularly if he still believes that an air compressor on a water pump is the only satisfactory means of maintaining a proper balance between water and air in the tank, but a reference to the accompanying sketches and the explanatory matter regarding them may possibly cause him to change his estimate of the value of such a combination.

It is desirable that the reader should have an accurate idea of the exact conditions that exist in an air compressor at various positions of the piston in the cycle of its operation, i.e., the drawing in of a charge and the expulsion of it again.

Fig. 1 shows a sectional view of a typical air compressor with inlet valve "A" and discharge valve "B" and, as its is necessary to proper efficiency that there should be as little space at the end of the discharge stroke as possible, the valve chamber is constructed as to leave no air in the cylinder at full compression stroke. See Fig. 1A.

The valves "A" and "B" are closed by springs, therefore, with the piston at the extreme suction end of its stroke, (Fig. 1) there would be sufficient vacuum in the cylinder to have opened the suction valve against its spring, and to re-establish an actual atmospherical pressure in the cylinder, it would have to move forward again perhaps one-fifth of its stroke (depending upon the tension of the spring) so that even under the most perfect conditions not more than four-fifths of the cylinder contents could be discharged at each stroke.

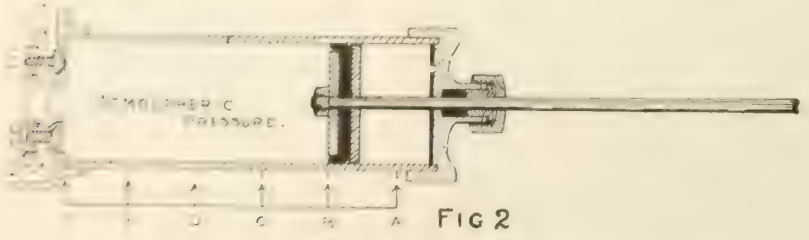


FIG 2

Now, assume that B in Fig. 2, indicates the position of the piston when the pressure in the cylinder is at atmosphere (approximately 15 lbs.) and the gauge registers zero (because all pressure readings begin at atmosphere) and that the piston now occupies a position at D Fig. 3, exactly midway between B and F, the mere fact that the air has been compressed into one half the space it formerly occupied (see Fig. 3), would cause the pressure to double—or, in other words, to register on the gauge 15 lbs. (plus atmosphere).

Fig. 4 shows the piston moved half way from the position D, which it occupied in Fig. 3, to the end of the stroke, compressing the air again into half the space it occupied in the former position, and again doubling the pressure, or raising it to 30 lbs. and so on to the end of the stroke.

Note this fact carefully, however, that even when the piston has been drawn back to the extreme end of the suction stroke (Fig. 1) and has travelled forward for three-fifths of the length of the compression stroke (Fig. 3), only 15 lbs. pressure has been generated.

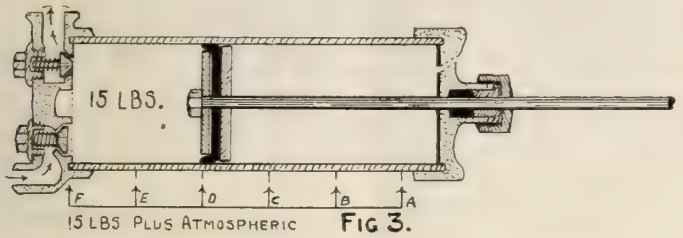
Now, let us consider the application of such a compressor to the usual type of hand pump furnished with a pressure system.

Fig. 5 and Fig. 6 show two typical applications. The former has the piston rod extending out from the centre of the water piston through a packing nut inside the head of the pump, but this is not now much used, because the packing nut is so inaccessible, and, like the check valve between the discharge side and the water cylinder, nearly always leaked back through the compressor to the floor, causing endless complaint.

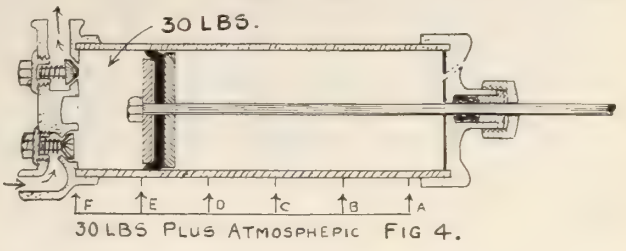
Fig. 6, like Fig. 5, still has the troublesome check valve on the discharge pipe, and whether it is connected into the pump above or below the valves makes no difference so far as leakage to the floor is concerned, but has an ad-

vantage over the former in that the piston rod is outside and detachable when not in use.

Now, as shown very clearly in Figs. 1, 2, 3 and 4, the piston must be sent from the extreme end of the suction stroke to four-fifths the length of the discharge stroke before any air is discharged at 30 lbs. pressure (and only from that point on is any air moved).



15 LBS Plus Atmospheric Fig 3.



30 LBS Plus Atmospheric Fig 4.

As a matter of fact, the pump handle is rarely moved more than three-fifths of its full stroke, because it requires too much effort to reach farther, and that being so, no air will enter the tank when the pressure is 30 lbs. or over, simply because the air is only compressed in the interior of the compressor to the limit, say, of point E. The backward stroke of the pump does not draw more air into the cylinder, it thereby releases the cushion, thus allowing the air to expand.

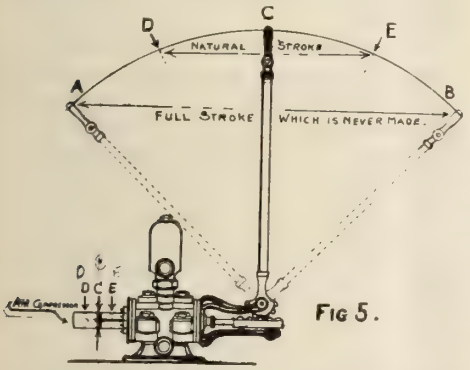


Fig 5.

C is zero, from D to E is natural stroke made when operating hand pump. Note position of piston in air compressor.

By actual tests it has been determined that the stroke of a common hand pump is approximately 4 feet 10 inches not counting the actual arc measurement which is nearly another foot, and no one will assert that a full stroke will be made, in fact from observations taken an ordinary stroke made is only about 2 ft. 3 inches. See Figs. 5 and 6. Such being the case it can be seen at a glance that when pressure is 15 lbs. or so, no air can possibly be forced into the storage tank.

Here is another proof, every sanitary engineer knows full well water is not compressible, while air is compressible. Therefore, both can not be forced into one tank in which a certain fixed pressure exists, because the pressure is really a fixed resistance against each stroke, and of course the water being incompressible will be driven into the tank, be the pressure whatever it may, whereas the air, as we stated before is simply compressed in the cylinder of the compressor and not actually discharged unless the stroke is positive, as would be the case with a power driven pump. Even then the stroke would have to be of such a length as would operate the piston from end to end as shown in Figs. 1 and 1A.

Now, what is the remedy? How can air be forced to enter the tank with the slightest movement of the handle?

The problem was solved by a member of the craft nearly 10 years ago, by placing a small needle valve on the suction line, the valve was originally taken from a gasoline firepot. This worked well, but was not sufficient because there were no means of holding the air drawn in. However, some manufacturers have eliminated the "air compressor" altogether, and substituted therefor a simple air cock in combination with a bronze ball check valve which is screwed into suction side of the pump and depends for its success upon a natural law, viz., that fluids will follow the path of the least resistance.

When this air inlet device is open and the pump is in motion, a certain amount of air will be drawn in with the water, and both are forced together into the tank, and, whether the piston moves an inch or six inches, the proportion of air to water is always the same.

There should be no misunderstanding about the question that the air is merely being compressed from, point D to E (when the pump is only operated between its stroke limits), and not discharged, which would be the case if the piston was driven home to point F, Fig. 1 A. thus positively discharging the contents of the compressor.

Objection is sometimes made that where the source of supply is above the pump the water will "flow" to it, where-

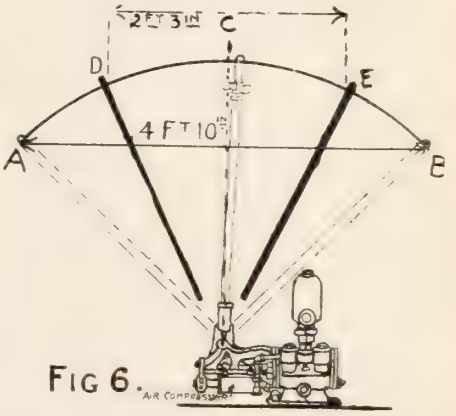


Fig 6.

From A to B the distance is 4 ft. 10 in., being the length of stroke required to make air compressor effective. C is dead centre of stroke. From D to E is the natural stroke made by actual tests.

as it must be "sucked" if air is to be "drawn in" and not "forced in" by a compressor, but the remedy for this is simple.

In Fig. 7 is shown a cistern, G, full of water, the suction pipe is placed on the floor level and through the side of cistern. The head of water would, of

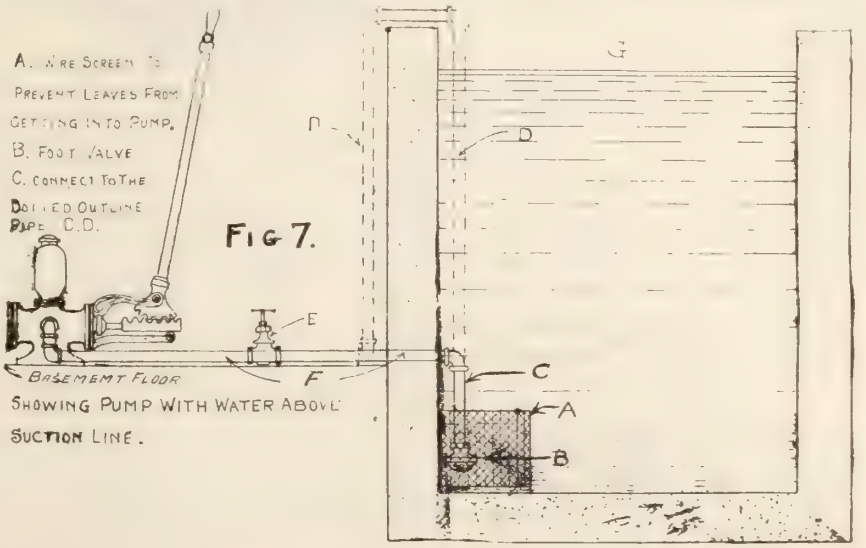


Fig 7.

(Continued on page 29.)

PRACTICAL SHEET-METAL WORK

BY THOMAS STANFIELD

WHILE the writer of this sheet metal course does not intend to overburden the student with too much geometry it is necessary to have some little knowledge of geometrical problems and theories.

One thing which is very essential in order to become a fairly successful sheet metal worker is to be able to picture in one's mind's eye the article which is required.

In sheet metal work it would be well to picture every article as something solid. For instance, note the various designs shown in plate 1. The drawing marked A in every case is the elevation. Now an elevation is the thing we see, or one side of it. It may have any number of sides, all of which may be different. But to be of value an elevation must be accompanied by a plan or number of plans. See drawings marked B.

The student should also try to train his mind to picture a perspective view. The examples marked C, show the perspective view of A and B. Perspective is the application of geometrical principles to drawing on a plane surface true resemblances or pictures of objects, as the objects appear to the eye from any given distance and situation.

Before going into these questions it will be well to be acquainted with a few of the geometrical terms and definitions in use in this particular kind of work.

A Point

A point has neither length, breadth, or thickness, it merely defines location.

A line is what might be called the connection of one point to another. It has length but not breadth. If a straight line, it is defined as the shortest distance between two given points.

A Broken Line

A broken line is really a number of short lines. Broken lines are sometimes called dotted lines.

A Vertical Line

A vertical line is a line perpendicular to the horizon such for instance, as would be made by a line hanging from the sky, and having something attached to it.

A Horizontal Line

A horizontal line is one which would always appear parallel with the surface of an expanse of water, or with the horizon from which the word horizontal is derived.

Parallel lines are lines which are in the same plane and which throughout their whole length are equidistant from one another.

Perpendicular Lines

Perpendicular in its ordinary sense is equivalent to vertical. In geometry however, a line is perpendicular to another line when it is drawn at right angles to it.

A Curve or Curved Line

A curved line is a line which differs from a straight line in that it is constantly changing in direction.

Angles

Any straight line drawn so as to meet another line will form an angle. It may be a right angle, acute angle or obtuse angle.

(Continued on page 32.)

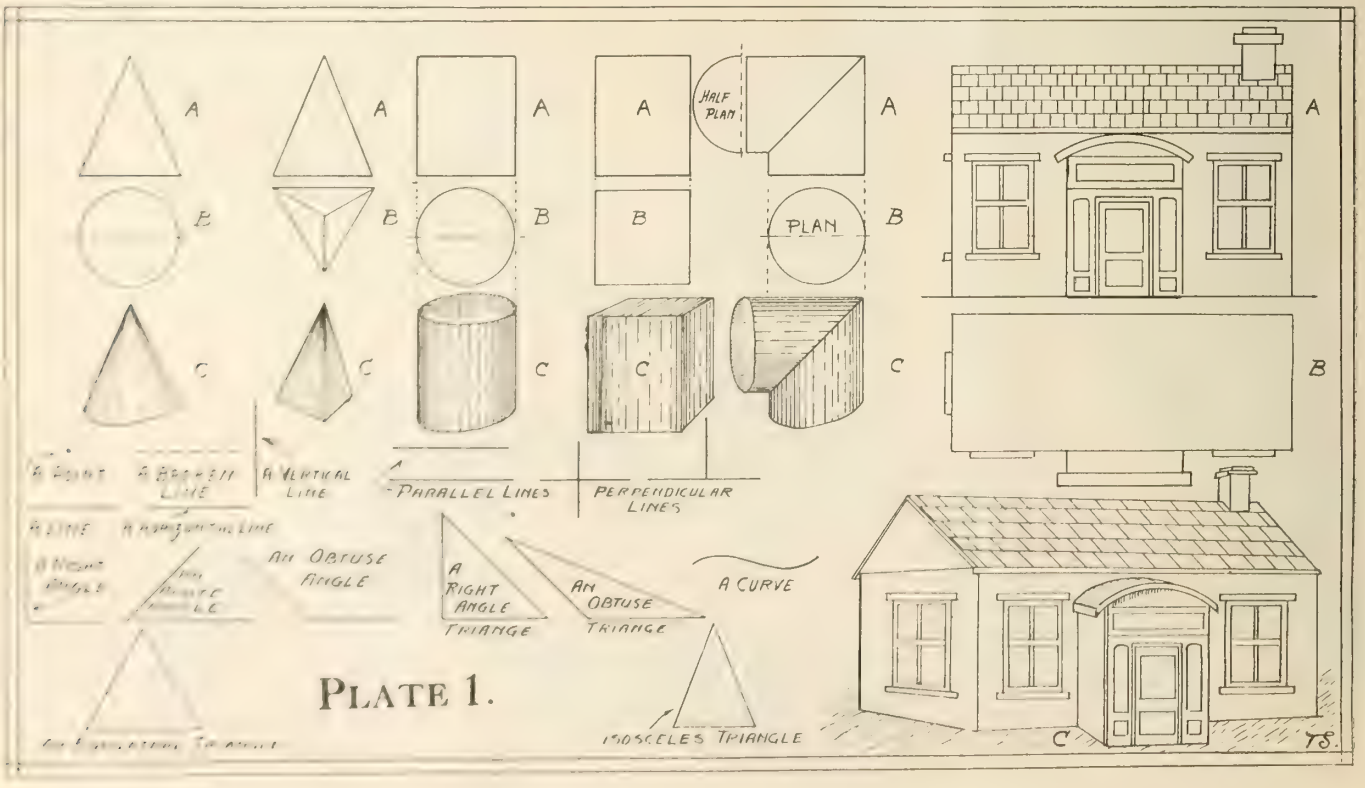


PLATE 1.

Solders and Their Uses

To Know What Solder Is, and How to Use it, Is One of the Most Interesting Branches of the Trade—It Should be More Thoroughly Understood by Those Who Use It.

Written specially for The Sanitary Engineer by Professor Arthur Bateman.

AN alloy or mixture of lead and tin produces solder known as best fine, half and half, or wiping solder, according to the percentage of tin added to the lead.

The proportion of lead and tin is altered to meet various requirements, and what may prove excellent for one purpose would be totally unfit for another .

The solder known as best fine is composed of three parts tin and one part lead. It is used only on very high class work and can best be manipulated with the aid of a torch.

Wiping with this description of solder is practically impossible, nor will it flow uniformly under the influence of the soldering iron.

Half and half, as the name implies, consists of equal parts lead and tin. It is extensively used in connection with the soldering iron, for tinning brass goods, making cup joints on lead and soldering seams, making and repairing copper sinks, and tin coated receptacles.

It is however, too fine for general wiping purposes. It adheres tightly to the wipe cloth and the procedure of cleaning the edges of the wiped joint is extremely difficult.

There are two distinct kinds of wiping solder, one being composed of sixty parts lead and forty parts tin, the other, two parts lead and one part tin. The former should always be used on pressure and good class work, while the latter will suffice admirably for joints on waste pipes, etc.

A wiped joint may be materially strengthened by a process known as "overcasting" which is readily executed with a small amount of practice.

Immediately after the completion of the joint, tallow same, pour a ladle of solder in a semi-molten condition over the wiped joint. The temperature of this solder is sufficient to melt a quantity of tin in the joint (melting point 440° Fah.) yet the lead in the joint (melting point 620° Fah.) retains its former shape. The molten tin appearing on the surface of the joint is quickly wiped round, thus adding strength and rendering it less porous, and consequently there is little likelihood of it sweating or sponging.

In making wiping solder, melt the lead first, afterwards adding the required quantity of tin and then thoroughly mix with the ladle, otherwise the tin which is of a less specific gravity than lead will keep on the surface and doubtless prove misleading. After this operation is completed, a test should be made to ascertain if such solder is fit for wiping purposes. Procure a stone slab, a brick, or a piece of marble or concrete, and run three or four samples of solder similar to a dollar in size and thickness.

When cold, it will be observed that their edges are very bright,while from three to six tin spots appear on the surface, and double this number of the underside. If the samples have a chalky

Professor Arthur Bateman

appearance and the underside looks the same, in fact if there are no spots visible, there is an insufficient quantity of tin. On the other hand, if there is too much brightness and many spots, it will not work well and more lead should be added.

It is always advisable for plumbers to take their own solder, as a few manufactures are always anxious to become rich at other people's expense, and a small quantity of antimony added to their brand of solder will give it an exceedingly fine and rich appearance, whereas the true quality is wretchedly inferior.

Before proceeding further let me warn the younger members of the craft to refrain from wiping with solder of an unsatisfactory temperature. If too hot, the pipe is liable to be burned, and if brass is used in connection with the lead the tinning will undoubtedly be burned off with the first ladle of solder. Should it be too cold much valuable time is likely to be lost and even if a joint is made it will be porous to such an extent that it will be imperative to re-wipe it.

To obviate this state of affairs we must test if for temperature before use. Take a piece of paper and dip it into the solder, leave one second, then withdraw. If the paper blazes it is too hot, if unaffected, too cold, if nicely charred or browned, satisfactory.

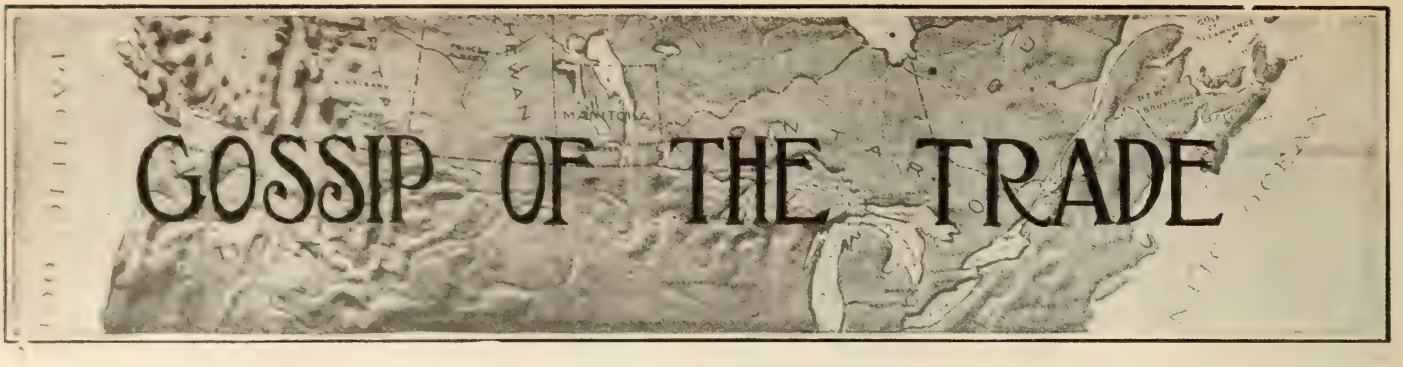
Let us now consider for a moment the poisoning of solder. Poisoned solder contains zinc which is brought about by constantly wiping on brass. Brass is composed of two parts copper and one part zinc. The latter has a very low melting point, namely 770° Fah. Now it invariably happens that the temperature of the solder exceeds this, with the inevitable result a small quantity of zinc is melted and intermingles with it, poisoning it, and rendering it quite unworkable.

It will be found that such solder has a very coarse appearance, there will be much crumbling, and it will work for all the world like wet sand. When cold, the surface has a crystalline appearance resembling galvanized iron. Lead pipe should not be used for making solder as a small quantity of zinc is added to facilitate its manufacture.

To purify poisoned solder take an empty pot and spread about one inch of powdered sulphur on the bottom of it, then just as soon as the solder to be treated is melted pour onto the sulphur. The sulphur will rise slowly to the surface and carry with it any zinc which may be present. This is due to the fact that sulphur has a great affinity for zinc. A thick scum of sulphur and zinc will form on the surface which must be carefully skimmed off, and the solder will then be fit for use.

What is considered an easy way of soldering brass consists of the following procedure. Cut a piece of tin foil the size of the surface to be soldered, then pass over the surface to be soldered a solution of sal-ammoniac for a flux, place the tin foil between the pieces, and apply a hot soldering iron until the foil is melted.

(Continued on page 32.)



JOHN H. LEAHY DEAD

Was Many Years Contractor in Montreal

The death occurred recently at the Royal Victoria Hospital of Mr. John H. Leahy, for many years a contractor in Montreal. He was born at Allumette Island, Que., 47 years ago, and came to Montreal in 1889, settling at Hochelaga. Among the contracts he executed in Montreal and Maisonneuve were the paving of Notre Dame street east and putting down the large steel pipe from 1st avenue, Maisonneuve, across the harbor and into the St. Lawrence. He built many sewers and many cement sidewalks in the city. For some years he was superintendent of the W. J. Poupore Co. dredging fleet and supervised the building of Tarte Pier. He married Miss Mary C. McCarney, of Merrickville, Ont., in 1901, who survives him. He leaves also his parents, five sisters and two brothers. Mr. W. McCarney, of the Kearney Tea Co., Mr. C. F. McCarney, of John Heaney & Co., Ottawa, and Mr. E. McCarney, traveller for the Montreal Locomotive Works, are brothers-in-law, and he was a nephew of Mr. W. J. Poupore, Westmount. He was a [illegible] of St. Aloysius Church.

SHEET METAL CATALOGUE.

A very attractive and well illustrated catalogue has come to hand from the Winnipeg Ceiling and Roofing Co. It [illegible] simple and practical line of [illegible] attractive designs of ceilings, side walls, borders, mouldings, cornices, steel shingles, roofing, eavetroughs, weather vanes, fireproof windows and doors, corrugated [illegible] and other ornamental [illegible].

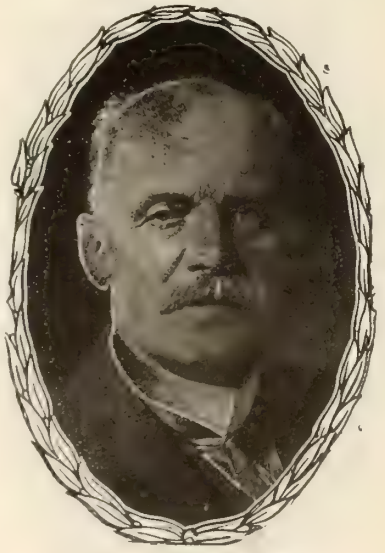
TOOL CATALOGUE.

The Keystone Mfg. Co., Buffalo, N.Y., has issued a new catalogue No. 24 illustrating and describing an interesting line of [illegible] tools, including [illegible], drill sleeves, etc. A [illegible] price list is included for the various lines.

The Death of Edward Gurney

Well Known in Canada and the United States as a Manufacturer—Held Many Important Offices—President Gurney Foundry Company, Limited.

A CAPTAIN of industry prominent not only in hardware and stove circles but in all trades throughout the Dominion passed away this week in the person of Edward Gurney, President of the Gurney Foundry Co. Mr. Gurney, who was 72 years of age, had been in failing health for the past two years, but his death occurred suddenly.



The late Edward Gurney.

Edward Gurney was the only son of the late Edward Gurney, of Holland Patent, N.Y., who, in company with his brother Charles, laid the foundation in Hamilton in 1842 of the foundry business of E. and C. Gurney. He was born in Hamilton in 1845. After receiving a general education at the local schools of that city, he entered his father's workshops, where he was given a thorough training as a moulder. In 1869 on being admitted to the firm, he removed to Toronto, where he was placed in charge of a branch of the business then being opened up. From a comparatively small beginning the works at Toronto have been gradually enlarged and the business extended until, to-day, it is one of the largest of its kind in the Empire. In 1891 the firm became an incorporated company under the name of The Gurney Foundry Co., with Mr. Gurney as President. A second branch was established in Boston in 1887.

Mr. Gurney was a public-spirited man and always took a keen interest in public affairs. He was an active church worker, and was for many years one of the leading workers in the Metropolitan church.

He was President of the Canadian Manufacturers' Association in 1879-80. He was President of the Toronto Board of Trade in 1897. More recently he was elected president of the Crown Bank For a time Mr. Gurney was also a member of the Temiskaming Railway Company Commission.

Mr. Gurney was a well known figure in tariff controversies and was an enthusiastic advocate of high protection. Mr. Gurney was not only a shrewd businessman, but a most agreeable person with whom to do business. He was a polished speaker, and captivated many an audience by the undercurrent of quiet humor which pervaded his remarks.

Mr. Gurney was President of The Gurney Foundry Co., Toronto; Gurney Massey Co., Montreal; Gurney, Heater Manufacturing Co., Boston. He was vice president of the Gurney North-west Foundry Co., Winnipeg; Vice-president of the North American Life Assurance Co. of Canada, and a member of the National, Toronto, and Automobile Clubs. Mr. Gurney was a staunch Conservative.

Mr. Gurney married Mary Frances Cromwell of Ingersoll, Ont., daughter of William A. Cromwell, January 2. 1868. They were the parents of the following children: Mary Irene, wife of W. Sandford Evans, Mayor of Winnipeg; Mabel Louis, wife of E. B. Bychman, of

Toronto; William Cromwell Gurney, Vice-President of the Gurney Foundry Co.; Edward Holt Gurney, Vice-President of the Gurney Foundry Co. and a member of the Council of the Toronto Board of Trade, and Gladys Gurney, unmarried.

ROLL OF HONOR

Welland town council on Thursday night, Sept. 21st., paid its tribute of honor to two local boys, heroes of the great war, in one case the honor being posthumous and in the other, fortunately, the gallant soldier has returned to his home town, though badly battle scarred.

Because of the bereavement which Mayor Crow has suffered, the regular business of the council was entirely set aside and the following resolution passed:

"Moved by Deputy Reeve Best and Alderman Dick,

"That this council learns with great sorrow of the unexampled grief that has fallen on the home of Mayor Crow and Mrs. Crow in the loss of their only son, Lieut. Gordon W. Crow, who gave his life for his country and the secred treasure of British liberty.

"That we express to them the most heartfelt sympathy of the people of this town and the members of this council, our high regard for the young man who has made the supreme sacrifice on the war scarred fields of France and our deep appreciation of his purpose, which was noble and of his valorous service which won for him the Military Cross

"And that this council, instead of proceeding with the business of this, our regular session, adjourn, out of respect to the Mayor, until Tuesday evening, Sept. 26."

The numerous messages of sympathy received by Mayor Crow and family, include same from Premier Borden and N. W. Rowell, K.C., leader of the Opposition in the Ontario Legislature.

Mr. Crow carries on a large plumbing and heating business in connection with his hardware line, and is well known to the trade. The Sanitary Engineer wishes to join the trade in expressing our heartfelt sympathy to him and his family in their sad bereavement.

Returned Hero Honored.

Previous to passing the resolution reported above, the council recognized the noble services of Bert Sneyd, who returned home some time ago.

SANITARY INSPECTORS ELECT OFFICERS

Prevented by conditions consequent upon tre war from holding a conference last year, the Sanitary Inspectors' Association of Western Canada agreed to meet in Winnipeg this year for the purpose of electing officers. The meeting took place in the city hall recently, when the following members were elected:—

President—Thomas Watson, Regina, provincial sanitary inspector for Saskatchewan.

Vice-presidents—Western Ontario, W. E. Stanley, Fort William; Manitoba, W. J. T. Watt, Winnipeg; Saskatchewan, F. Cartlidge, Moose Jaw; Alberta, J. J. Dunn, Calgary.

Executive—W. F. Thornley, R McQuinlan, D Little, and E. C. Brown, all of Winnipeg.

Secretary-treasurer—A. Officer, Winnipeg (re-elected).

Auditors—H. B. Weston and J. W. Stewart.

The retiring president, E. W. J. Hague assistant chief health inspector, Winnipeg, was heartily thanked for his past services and elected to the executive board.

Annual reports presented showed that interest in the association was maintained throughout the west, that the membership was gradually increasing, that 23 members had enlisted, and that the finances were to the credit of the association.

New Members.

The following four new members to the association were elected: W. Durrant, Moose Jaw; A. G. Briscoe, J. G. Laurie and A. S. Allen, Regina.

Congratulations were extended to P. B. Tustin, of Winnipeg, upon his appointment as honorary secretary for Manitoba and member of the Royal Sanitary Institute, and also to Mr. Watson, the new honorary secretary, and member of the institute for Saskatchewan. The very successful efforts of Mr. Tustin made in the interests of the association were recognized by many speakers, and the honor the R.S.I. has conferred upon him was held by all to be a very deserving one.

A. Officer, the secretary was also warmly thanked for his splendid service given in preserving the interests of the association.

THE CUP AND THE PLATTER

One does not know what to think of the Board of Health's demand that lavatory accommodation be put into every house within a certain area. Why question the proceeding? Because some of the rouses are not designed to admit of the alterations that are involved. We know of little homes that have been badly mutilated in the desire of the landlord or tenant to comply with the law, and when the work has been completed there has been a lingering doubt as to the expediency of it.

The Whig is less concerned with the little places, where dry earth closets can be made very serviceable, than it is about the larger and newer places in which the plumbing is very faulty. There is an inspection of houses and plumbing, but it cannot be satisfactory until it is the special duty of some one who has the time to follow up any clue to inefficiency and remove it.

Patent flush tanks there are in infinite variety. The style and mechanism depend upon the price, and there are rattle traps innumerable which should be pulled out of the houses and committed to the scrap heap. The scriptural description with regard to the manner in which some people scour the outside of the cup and the platter, while the inside is all uncleanness, has a special application to the sanitary appliances in many houses.—Kingston British Whig.

HYDRO-PNEUMATIC HAND PUMPS

(Continued from page 25.)

course, flood the pump until the level of the water is lowered below pipe F, and, of course, no air could be drawn into a pump thus flooded. Moreover, in an ordinary installation as shown, even the water may not be discharged. It may simply oscillate between points. A pump requires work to do, therefore, some work must be given to it.

No sanitary engineer, jealous of his reputation, would put in a system such, for instance, as is shown in Fig. 7, without putting a gate valve in the suction line, as shown, so that if the necessity arose for taking the pump apart, the water could be shut off. The partial closing of this valve will create any degree of suction required—the valve is gradually closed while the pump is in operation, until the air begins to be "drawn" through the air valve, and left at that.

Even if the suction pipe is carried up over the tank, as shown by the dotted lines, a valve is still necessary, as otherwise the water will syphon over if the pump is disconnected, and in the latter case, a foot valve is also required.

NEW CATALOGUE

The Gray Mfg. & Machine Co., Toronto, are distributing to the trade a new bulletin No. 14, dealing with the "Gray" power pumps and water supply systems. The bulletin contains a brief description of the systems and specifications covering the various sizes of pumps and tanks, etc., with price list. The bulletin is illustrated.

Covering of Pipes and Boilers

The Time to Advocate Covering of all Piping and Boilers Used for Heating or Power. Money Can be Saved in Fuel, Wear and Tear of Plant and More Effective Service Received

By T. W. R.

THE insulation of steam mains and return pipes is of much importance. There is no detail of the heating and power plant which gives better returns for the money invested. A low pressure steam heating main will give off approximately 2.1 heat units per square foot per degree difference in temperature between the temperature of the steam and the surrounding air. At 100 pounds this becomes 3.1 heat units. From 50 to 88 per cent. of this may be prevented by the use of insulating pipe covering. The higher the steam pressure the greater the resulting difference in temperature, and consequently the greater the loss of heat; therefore, the higher the pressure the higher the grade of insulation required. Similarly, the higher the steam pressure, the thicker the insulating material should be. Standard thickness of pipe covering varies from ¾ inch in pipe coverings for ¾ inch pipe, to 1¼ inch or 1½ inch in pipe covering for 12 inch pipe. Ordinarily, standard thickness means approximately these thicknesses.

Steam Main Covering Only

In some installations the steam mains are covered, while covering is omitted from the return pipes. There is little warrant for this, although in the case of the vacuum system it offers fewer disadvantages, in-as-much as the pumps handle better the cooler water. The covering of return pipes is often seriously damaged by mechanical injury as such pipes are usually of necessity located near the floor.

Condensed steam in steam pipes is increased by bare radiating surfaces, in consequence, annoying and troublesome water hammer with its attendant evils result. The amount of water present through condensation may be appreciated when it is considered that uncovered 6 inch pipe, 150 feet long, carrying 3600 pounds of high pressure steam per hour will condense, approximately 6 per cent. of the total steam carried, through radiation.

In the general estimation the magnesia covering, consisting of 85 per cent. pure carbonate of magnesia and 15 per cent. of pure long asbestos fibre ranks highest as an insulator for steam surfaces. Equally efficient, however, is the asbestos sponge-felted pipe covering, consisting of 85 per cent. of laminations per inch of thickness, composed of pure asbestos fibre interpersed with particles of ground sponge and other inert fireproof material. In the same class is the asbestos fire-felt covering consisting of 85 per cent. by weight of pure long asbestos fire-felt covering and 15 per cent. of finely ground inert fireproof bonding material, the fibres not being pulped or moulded, but rather felted together. The above only may properly be regarded as, or used for, high pressure covering, that is, pressures above 75 pounds per inch. A cheaper covering means a greater loss of heat.

Intermediate Pressures

For intermediate pressures, it is desirable to use the same grade of covering, but, if less expensive covering must be used, the asbestocel covering may be substituted at a less expense. This is similar to the well known air cell covering, except that the cells are so placed as to run concentrically with the pipe, each cell being closed against the next adjacent cell. The material of which this is made consists of 70 per cent. pure grade asbestos fibre and 30 per cent. inert fireproof bonding material. Standard air cell covering is made with the air cells running longitudinally with the pipe. While this is sometimes used for intermediate pressures, it is not as efficient or durable as the asbestocel covering. For low pressure heating pipes, the air cell covering may be used to advantage. A cheaper covering is the asbestos moulded pipe covering, but this contains only seven to eight per cent. of asbestos fibre, the balance being finely divided inert fireproof bonding materials, largely plaster of paris.

The first three coverings 1 inch thick will save about 80 per cent. of the heat lost in bare pipes, the asbestocel 72 per cent., the standard air cell 65 per cent., and moulded asbestos covering and asbestos cement 58 per cent. Thus the loss with the latter is about 2 1-3 times greater than with the first for the same temperature difference. Hair felt, although a good insulator should not be used on steam surfaces because of the fact that the heat disintegrates the hair, and, as a result, the covering is short lived. This is true even though the hair felt covering may have an interlining of asbestos paper.

For use on fittings and irregular surfaces, asbestos cement, sometimes termed "cement felting" is used. This is a plastic cement which should consist of 70 per cent. of pure asbestos fibre and 30 per cent. of inert fireproof bonding material. As usually applied such a high grade of this cement should cover 30 sq. ft. of surface 1 inch thick per 100 pounds. The cheaper asbestos cements weigh more and consequently cover less area per 100 pounds and are less efficient as insulators. For very hot surfaces, an air cell covering called Vitribestos is sometimes used. This is used as smoke stack lining or uptake covering and tube door lining. Pipes in cold air chambers should have two layers of covering of standard thickness. Blow-off pipes and outboard vapor pipes need not be covered.

Applying the Insulation

It is particularly desirable that all pipe covering should be applied by the manufacturer of the materials used. If left to the workmen of the heating contractor, the work will probably be improperly done, and to allow one covering contractor to apply the materials made by another involves a division of responsibility which is not desirable. The covering of standard small fittings may be moulded or may be of plastic cement, but should be of the same thickness as adjacent pipe covering.

Flanged coverings may be made removable and replaceable if made of sponge-felt or fibre-felt covering, first applying rings on the adjacent pipe of sufficient thickness to build up the covering to the maximum diameter of the flange, and then applying sectional pipe covering over the rings and flange together. These should be divided on longitudinal axis of the pipes and finished in cement with 10 ounce canvas neatly sewed on.

Concealed risers may be covered with air cell moulded covering, and where space is limited this may be reduced to ¾ inch thick. Where the riser is exposed, a 10 ounce jacket should be sewed on in a continuous length from the floor to ceiling, fitting snugly about the various connections, the seams to be made on the back of the pipe where they will be least observed. It is desirable also that the risers be painted one coat of glue size and two coats of best white lead paint to match the color of the walls.

Hot Water Piping

Hot water pipes may be covered with

air cell or asbestos moulded covering, or even with the standard wool felt sectional covering having an interlining layer of heavy asbestos paper. Cold water pipes in occupied rooms which are warmed to ordinary temperatures, and particularly in boiler, engine and pump rooms, should be covered to prevent sweating. The material used for this purpose should be pure cork free from artificial bonding material, approximately 1½ inch thick, the material to be finished inside and outside with a damp-proof rubber composition. A canvas jacket may be sewed on.

The smoke pipe and uptake connections, and also any overhanging parts of boilers which are heated, should be covered with 1 inch of asbestos blocks wired on, over which there should be applied 1 inch of asbestos cement felting thoroughly wired on with a hard smooth finish. In large installations this material should be applied over a 1 inch air space made with ½ inch mesh No. 19 galvanized iron wire and 1 inch nipples, using four nipples to the square foot. The boiler tops, where not enclosed in masonry, may well be covered with 1½ inch air cell blocks with 1 inch asbesos cement finish. A ½ inch additional asbestos cement and Portland cement mixture will give a hard durable surface to this covering.

Equipment Unit Insulation

Sectional boilers, feed water heaters, hot water boilers, pump receivers, separators, extractors and other hot iron surfaces of irregular form may be covered with 1 inch to 2 inch of asbestos cement felting wired on and finished smooth and hard. Where desired, a 6 ounce canvas jacket may be sewed on over these cement surfaces, although this is not customary. As a substitute for the light weight canvas, which is more like cheesecloth, a 10 ounce canvas jacket may be sewed on over pipes in finished or ornamental rooms. This is often done in engine rooms where appearance is an important element. On pipes placed in tunnels, trenches, manholes and pits, a waterproof roofing paper bound on with No. 18 annealed copper wire, the wire being passed around the covering and fastened at 6 inch spaces, is a desirable substitute for the canvas jacket.

Hot air heating ducts in walls and in outside walls should be covered with ½ inch asbestos sheets throughout their entire length. Ducts and indirect radiator casings with ½ inch air cell sheets and ½ inch asbestos cement felting. If further consideration need be given to appearance, an 8 ounce canvas jacket may be pasted on to this cement surface and the surface may then be painted one coat of glue size and two coats of white lead paint of color desired.

Where desired, the pipe covering may be painted, either with water paint which may be applied without the glue size (preferably in two coats), or with best white lead paint of any color desired. Where lead and oil paint is used, a glue size must first be applied, as otherwise the lead and oil will sink into the insulating material, lessening its efficiency and losing the effect of the paint. Brine and ammonia pipe coverings should always be of cork, brine pipes being covered 3 inch thick, and ammonia pipes 2 inch thick.

Manifestly, pipes should not be supported by clamping directly to the pipe covering. The fire hazard of steam pipe and other hot surfaces when near or in contact with wood or other combustible material has been thoroughly investigated by the National Fire Protection Association and other underwriters. Their various requirements for the insulation of such hot surfaces and protection of adjacent woodwork, space between, etc., should be followed out, a discussion of such protective measures being outside the scope of this article.

End of German Dumping?

Meeting of Manufacturers Held in Berlin—Trying to Avoid Mistakes of Past—Unsatisfactory Competition in Foreign Markets.

ACCORDING to the Ironmonger, London, England, the ominous fall in the foreign exchange value of the mark is evidently disturbing the German business world very seriously. Some temporary relief has been afforded by the arbitrary action of the manufacturers' syndicates, backed by the Government, in repudiating their running contracts with neutral buyers of their goods by suddenly raising prices all round to the extent of the depreciation of the mark, and something over. But that is at best a makeshift, which can serve its purpose only so long as there is no effective competition from other countries in the neutral markets. Other measures are therefore being devised in the hope of staving off the trouble when peace is declared.

With this end in view, a meeting was recently held in Berlin, under the auspices of the German Government, which was attended by about 200 manufacturers of metal goods from all parts of the Empire. The chair was taken by an official of the Central Office for Export Licences for Metal Manufactures, and 26 trade associations were represented. It was unanimously agreed that the exchange value of the mark must be raised, and that in other industries the establishment of central offices for the fixing of prices (for export) had proved an efficacious remedy to this end. The meeting therefore resolved to establish a cognate office for the metal industries, subordinate to the Central Office for Export Licences.

Several speakers laid stress upon the admitted difficulties of carrying out such a scheme in the metal industries owing to the extraordinary diversity of their products, which made the fixing and conditions of sale a task almost surpassing the wit of man, and there was a general agreement that the industries concerned were entitled to have a say in the matter.

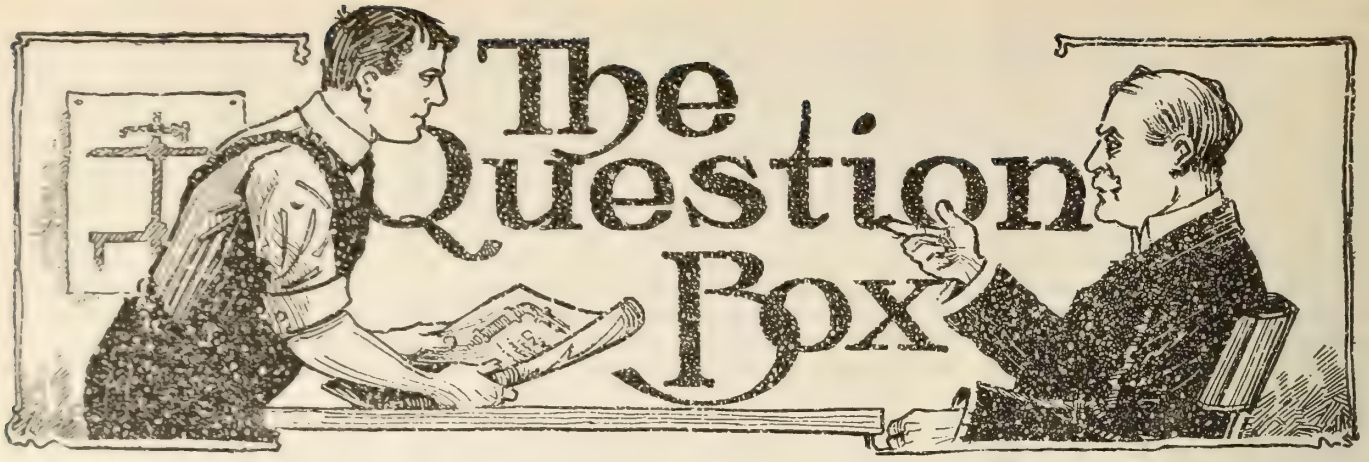
In the end, fifteen committees were elected to consider how the scheme could be carried out with due regard to the interests of the various branches of the export trade in metal manufactures, the peculiar conditions of each foreign market, and so forth. Other committees are to be set up as occasion arises.

The official report of the proceedings concludes with the following sententious piffle: "The day of this meeting may constitute a turning-point in our economic and historical development, for on this day the principal groups of the great metal-industry, unitedly and self-consciously (sic!), taught by the experience of the world-war, took the first step towards the avoidance for the future of the grave mistake which has been made in the past of carrying on an unsatisfactory competition in foreign markets by making unprofitable offers, cutting prices, and making special concessions."

STIMULATION OF COUNTRY TRADE

Sanitary engineers, who are interested in the installation of pneumatic or gravity water supply systems, will appreciate the assistance which the Ontario Wind Engine and Pump Co., Ltd., purpose rendering during the coming months. This assistance, we understand, will be in the nature of an educative campaign of advertising, which will appear in the leading farm journals, and which should be of great help in opening up the rural plumbing trade.

The management of this company is, at the present, in the hands of Mr. A. T. Thom, who has had many years' experience in the water supply business. We believe that under his direction the company's relations with the city and rural sanitady engineers will be most pleasant. His progressive policy is firmly supported by the broad experience of the company, which covers a period of over a quarter of a century.



Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

Should Slide Door Be Kept Open?

Editor The Sanitary Engineer.

I would like to ask you about a matter which may appear to be simple, yet is I believe to some extent debatable. Should the slide be kept open on the firing door of a steam or hot water furnace, and if it should be kept open, why? Some people claim it should be closed, some open? I spoke to a boiler traveller recently, and he could not tell me definitely what should be done. Your early answer will oblige

STEAMFITTER.

It is a very easy matter to say a certain thing should or should not be done these days, but most such answers are not complete without the "why." First, the slide should be kept open, but there is no reason for closing it entirely. If it should be closed why put one on? And without doubt there are thousands rusted

It might not be out of place to mention that these slides are made so as to allow air to pass into the fire-box of the fuel, the slide in the ashpit door is for the purpose of supplying air under the coals not merely for draft, but to actually assist the proper combustion of the coal gases. A person who insists upon keeping the slide in the firedoor closed will find a large amount of soot in the firebox or passages in the sections or tubes of the furnace. Why? Simply because the gases have not been consumed. If one were to remove the slide when a fire was burning and watch the flame, then place a sheet of mica over the opening and again look at the flame, there would be a change. With the slide open a blue flame would be noted, closed and the flame would be a reddish black hue.

Why? Because, in the first case, oxy-

[illegible] place, which it not the case in the second

Here is another, yet very simply example, which proves the necessity of air on top of the fuel or flame.

Take an ordinary coal oil lamp, turn the wick up to light it, and if left in that position, the "lamp will smoke." This proves that there is too much fuel (oil) being burned for the quantity of air passing through the small holes in the under size of the burner.

Now lower the wick, and the flame brightens. Why? Because the fuel (oil) has been reduced, whereas the air is stationary. Were it possible to regulate the fuel and have a fixed quantity of air holes in a furnace, a great saving of fuel would be effected.

Some persons have been known to say "Our furnace burns up all the smoke." No such condition ever existed. Smoke will not burn once it is smoke, but gases will burn up all the properties of which smoke is made up, and thus prevent smoky furnaces. Smokeless down-draft boilers are not "smoke consumers," but rather are they oxygen consumers. They consume more air, and thus give off a greater heat, "smokeless heat," which means all the available heat units which are in the coal are consumed instead of creating a lot of soot and smoke. Any means, whether through the slide door or through what is known as oxygen burners that will cause a greater amount of air to be consumed in the firebox of a furnace is to be commended, and therefore it will be seen "why" the slide on a firedoor should, when the fire is burning, be kept open.

EDITOR.

SHEET METAL WORK

(Continued from page 26)

If one line meets the other perpendicularly the angle so formed is called a right angle. If the angle so formed is smaller than a right angle it is called an acute angle and if larger than a right angle it is called an obtuse angle.

Triangle

A triangle is a figure bounded by three straight lines, not necessarily of equal length. If one of the angles formed by two of these lines is a right angle the triangle is called 'right-angled,' if one of the angles is obtuse, it is called 'obtuse-angled,' and if all three angles are acute it is called 'acute-angled.' If the three sides are all equal the triangle is 'equilateral,' if two sides are equal it is called 'isosceles,' if all three sides are unequal it is called 'scalene.'

SOLDER AND THEIR USES

(Continued from page 27.)

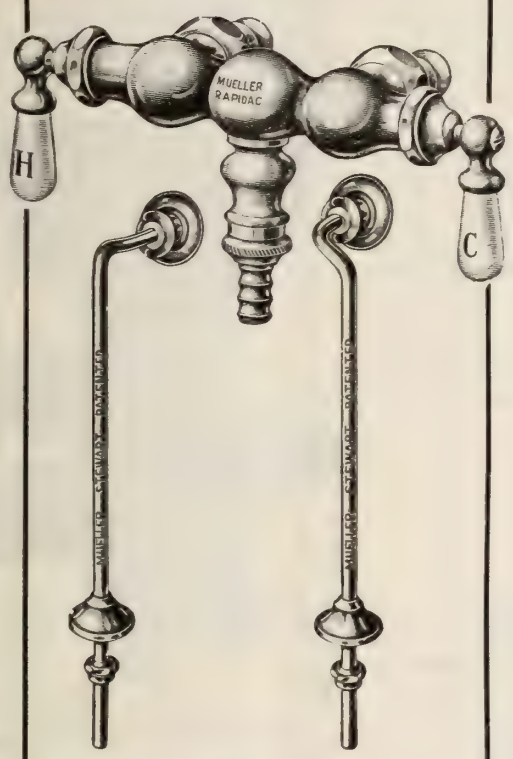
Another solder of interest to plumbers is known as "bismuth solder" and will melt in boiling water, or at a temperature of 201° Fah. It is composed of bismuth eight parts, lead two parts, and tin two parts.

Aluminum is very difficult to solder and needs a special solder to execute a proficient and workmanlike job. Many different kinds of solder have been made for this purpose but the one giving the best results is composed of tin sixty-five parts, zinc 30 parts, and bismuth five parts.

It is almost an impossible task to solder directly on iron, but if the surface to be soldered is moistened with blue vitriol a film of copper will be formed, on which half and half solder will adhere satisfactorily.

A solder which is applied to the cleaned parts without the aid of any heat is composed of the following: Brass filings, two ounces, steel filings, two ounces, fluoric acid one quarter ounce. The filings are put in the acid and the solution applied to the parts to be soldered.

Another form of solder which is not designed for joining metals but for plugging holes, cracks, etc., is simply rubbed into the leak, without the aid of any flux. It sets very hard, and is not affected in any way by heat or moisture.



**Fuller in Design—
Compression in Action**

Two Designs in

MUELLER *Rapidac*

THE MORE YOU KNOW
ABOUT BRASS GOODS
THE BETTER YOU LIKE

The Mueller Line

One of our customers said:

"My father and I have been in the plumbing business over 25 years and our biggest losses have been caused by troubles with inferior brass goods.

"We are building up a splendid business on quality brass goods. Every dollar we spend with Mueller's is like putting money into the bank with compound interest.

"WE NEVER HAVE TO GO BACK TO REPAIR MUELLER RAPIDACS."

The Mueller Line costs a little more than the ordinary ones — but you buy more quality and more satisfaction.

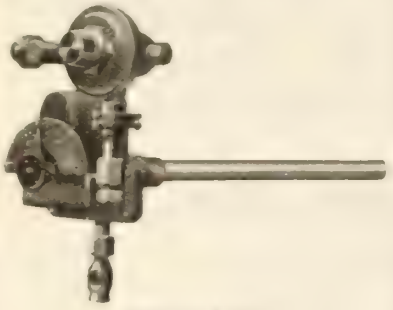
Sold by all jobbers throughout the Dominion.

H. Mueller Manufacturing Co., Limited

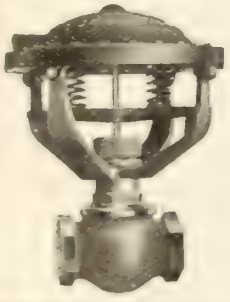
SARNIA, ONTARIO

POWERS MONEY SAVERS

No. 10 Tank Regulator



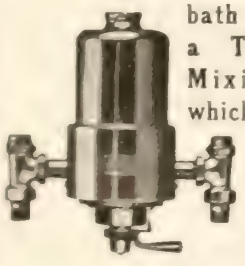
REGULATOR



Applied to Domestic Water Heaters. Prevents Over-heating and Saves Steam.

DIAPHRAGM VALVE

Satisfaction Guaranteed



Powers Shower-bath Controller a Thermostatic Mixing Valve which insures a constant temperature.

Easily adjusted to any desired temperature.

Positively Anti-Scalding.

The Canadian Powers Regulator Co., Ltd.

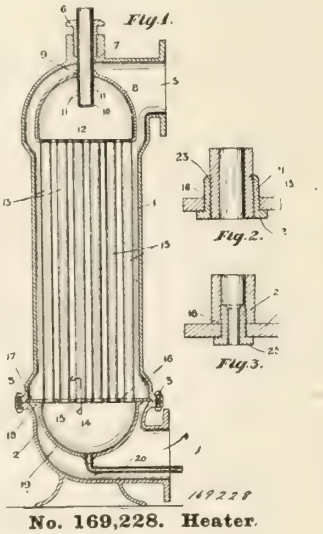
115 Bay Street, TORONTO

New Patents

No. 169228—

Albert Langevin, Montreal, Quebec, Canada, 2nd May, 1916; 6 years. Filed 13th January, 1916. Receipt No. 259,902.

Claim.—1. A heater comprising a casing and a base, a water inlet in said base and a water outlet in said casing, a dome in the uppermost part of said casing having a flat, perforated bottom, a plate secured between the lower end of the casing and the base, said plate being provided with threaded perforations, a dome in the lower part of said casing secured to said plate, tubes connected at their upper ends to said upper dome and provided at their lower ends with a thread, a perforated plug engaging the thread on the lower ends of said tubes and threaded perforations, a pipe connected to the lower part of said lower dome, leading



No. 169,228. Heater.

the condensation water through the water inlet, and means to supply steam from the top of the upper dome, substantially as described.

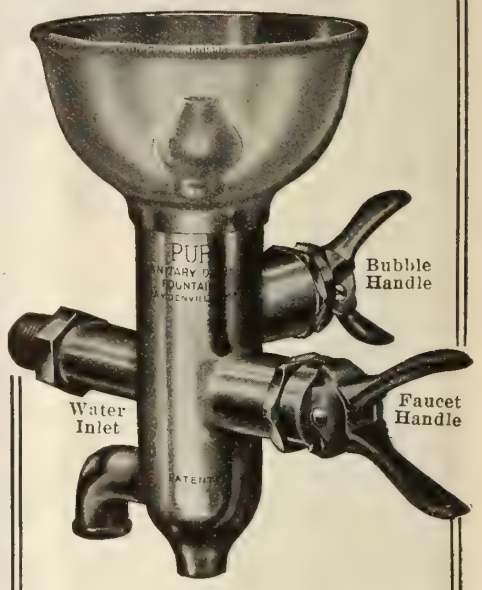
2. A heater comprising a casing and base, a water inlet in said base and a water outlet in said casing, a dome in the uppermost part of the casing having a flat, perforated bottom, a plate secured between the lower end of the casing and the base, said plate being provided with threaded perforations, a cup-shaped casing, the outer edge of which is provided with a flange, means to secure said flange to the under side of said plate, tubes threaded in the perforations in the flat bottom of the upper dome, said tubes being provided with threads on their lower ends, a collar threaded on the interior and exterior provided with a square head at one end, said collar engaging a corresponding thread in the perforations in the lower plate, the interior thread on said collar engaging the thread on the lower end of the tube.

PURO

(MADE IN CANADA)

Saves Dollars

Why let that old-fashioned faucet go on year after year wasting water—MONEY? Why more drinking cups and glasses, only to become unsanitary—lost, broken or carried away? Puro Sanitary Drinking Fountain stops all this needless waste. Puro saves you 35% on the water bill alone. Puro saves you all that money you spend for cups. YET Puro is always ready with a clear, cool drink with dollars in the bank.



Puro Pays for Itself

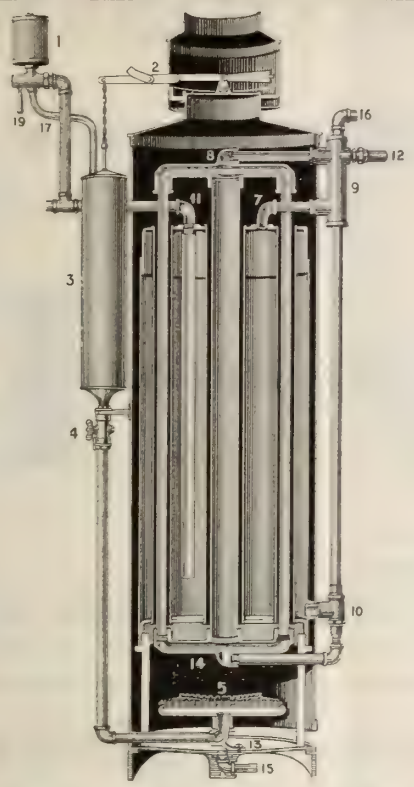
You don't have to wait years to get back the small investment you have tied up in Puro equipment—
You start cashing in at once—not only on your water bill saving, but on the increased efficiency of your workers as well.
Men like PURO—it's clean. No danger of deadly germs lurking in its sparkling bubble.
Write us—tell how many men, how many departments, and we'll tell you how much the cost will be to

"PURO-FY"

YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company
147 University Ave., Toronto, Canada

Kindly Mention This Paper When Writing Advertisers



The Allman Automatic Gas Water Heater

Efficient, Economical and Durable
The Only Superheater on the Market

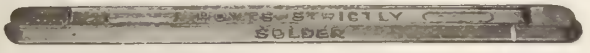
Will light from any floor.
Measures the gas each operation.
Will supply water at any temperature up to 212° Fah.
20 gallon bath in 8 minutes for 12 feet of gas.
No possible waste of gas.

The Allman Automatic Gas Water Heater is entirely new in every respect, but has been put to the most severe tests before being put on the market. It has many claims of superiority besides those mentioned above—speed, small gas consumption, heat from pilot utilized, self-extinguishing, danger of gas poisoning eliminated, etc. Write for circular and learn about this, the last word in Gas Water Heating.

The James Morrison Brass Mfg. Co., Limited

93-97 Adelaide Street West, TORONTO

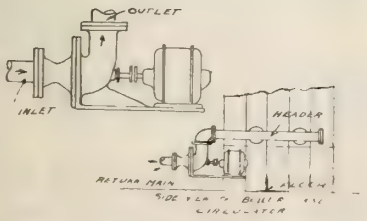
Our Mixed Metal Sales Amount to Over $5,000,000 Annually



HOYT'S WIPING SOLDER is as perfect as experience and first class ingredients can make it. As only one perfect Wiping Solder can be made we manufacture only one grade, which must necessarily be Hoyt's high standard of quality.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends. Your orders will have prompt and careful attention, not sometimes—but all the time.

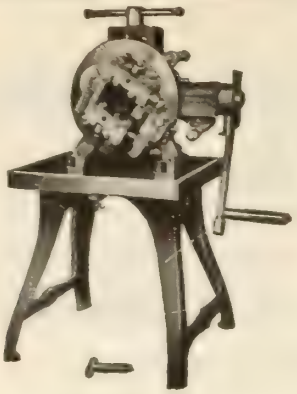
HOYT METAL COMPANY, TORONTO, ONTARIO
New York, N. Y.; London, Eng.; St. Louis, Mo.



THIS POSITIVE CIRCULATOR

Will make hot water jobs circulate which will not circulate by gravity or pressure. No by-pass required. No danger due to excessive pressures. Gravity jobs which take three to four hours to heat up will heat in 30 to 40 minutes with the circulator. It saves coal, as it brings the temperature of the radiators to practically the same as the boiler. The current required is less than that required by an electric iron. No foundation required.

Robert Angus, HEATING SPECIALIST **514 William Street, London, Ont.**



No. 00

PIPE MACHINES

Either Hand or Power

This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
A time and labor saving machine.

Manufactured by

THE ARMSTRONG MFG. CO.
317 Knowlton Street
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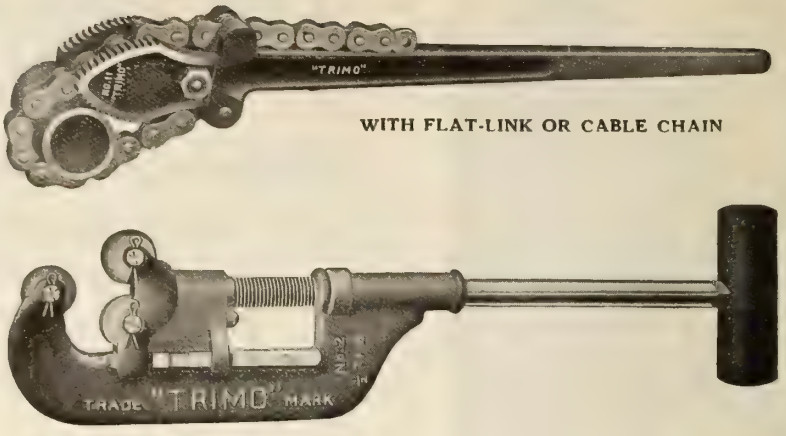
World-Famed Specimens of the Age of Steel

TRIMO



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TOOLS

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Advice and Plans on Water Supply and Sewage Disposal for Residences, Factories, etc.

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OSTER PIPE-THREADING TOOLS

comprise 47 distinct die-stocks, bench and tripod tools and pipe machines—all having the speedy Oster action. Ask for catalog.

2084 OSTER MFG. CO., 2160 E. 61st St., CLEVELAND, OHIO

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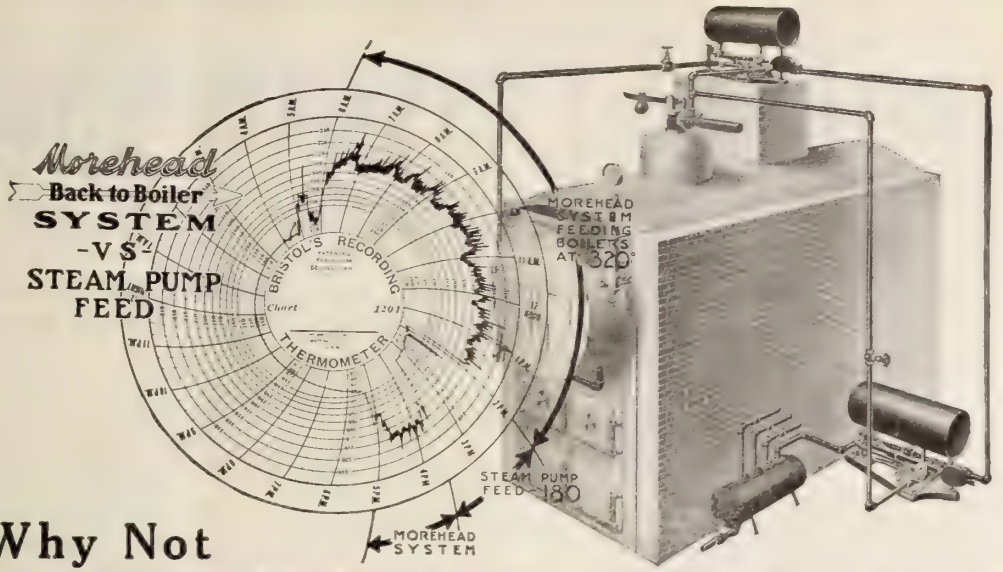

Why Not A Third Method of Boiler Feeding?

SUGGEST to your customer (prospect as well) a third method of boiler feeding.

Advise him to keep his Injector and Steam Pump as Auxiliaries, but for economy in every sense of the term drain his steam lines—whether heating, drying or cooking—and feed his boilers, simultaneously with the

Morehead Back-to-Boiler System

Condensation is instantly removed from the heating surfaces and returned direct to the boiler while HOT—automatically—wastelessly—90% cheaper and 100 degrees to 150 degrees hotter than a pump can do it. Write for complete facts and economy figures—no obligations. Address

Canadian Morehead Mfg. Company, "Dept. C" Woodstock, Ontario

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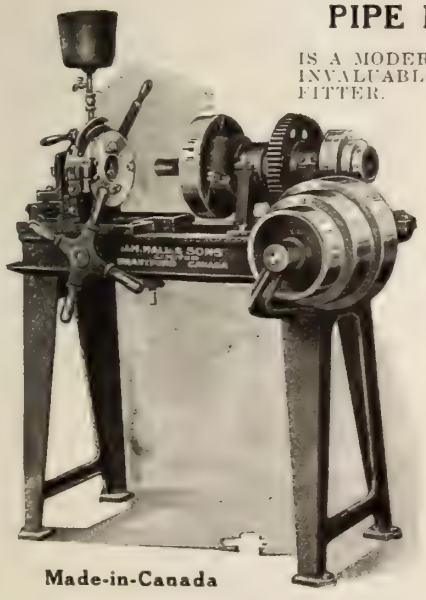
Save TIME and PIPE and CUT TRUE THREADS

THE HALL NO. 2 PIPE MACHINE



IS A MODERN TOOL THAT IS INVALUABLE TO THE PIPE FITTER.

Built in Canada for a maximum amount of accurate and efficient service to Canadians, and they cost less than imported machines.

Capacity, ¼-in. to 2-in. pipe. Nipples, ¼-in. to 2-in. Bolts, ⅝-in. to 1½-in. Hand, Belt or Motor drive.

Only one of the many sizes manufactured by us.

Ask the user about Hall machines — we'll gladly furnish you with names.

Prompt delivery from stock.

Made-in-Canada

JOHN H. HALL & SONS, Limited
BRANTFORD, CANADA

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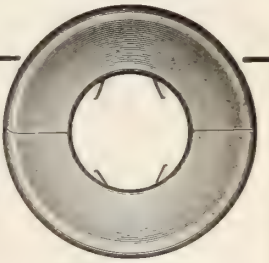
The CEILING PLATE that's better



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THE NO. 10 A NARROW FLANGE PLATE IS A STEEL HINGED PLATE. FLANGES ¾" WIDE. HIGHLY FINISHED. ESPECIALLY DESIGNED FOR TWIN CONNECTION "NARROW."

The split ceiling plate is coming more and more into use than ever and ALWAYS GIVES A NICE FINISH, because it can be attached to mains and risers at the very last, and is not exposed during completion of a building on the floors.

High quality at the right price

Gem No. 4.

Gem No. 4 Automatic Air Valve

Made from the best brass obtainable. Pressed shell and pressed brass base which eliminate danger from blowholes, which is a fault with cast bases.

Write for catalog showing our complete line of specialties.

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"King" Boiler Service

WHEN you sell and install a "King" Boiler, you have secured a lasting customer, because the "King" Boiler is built for service—"Long Service."

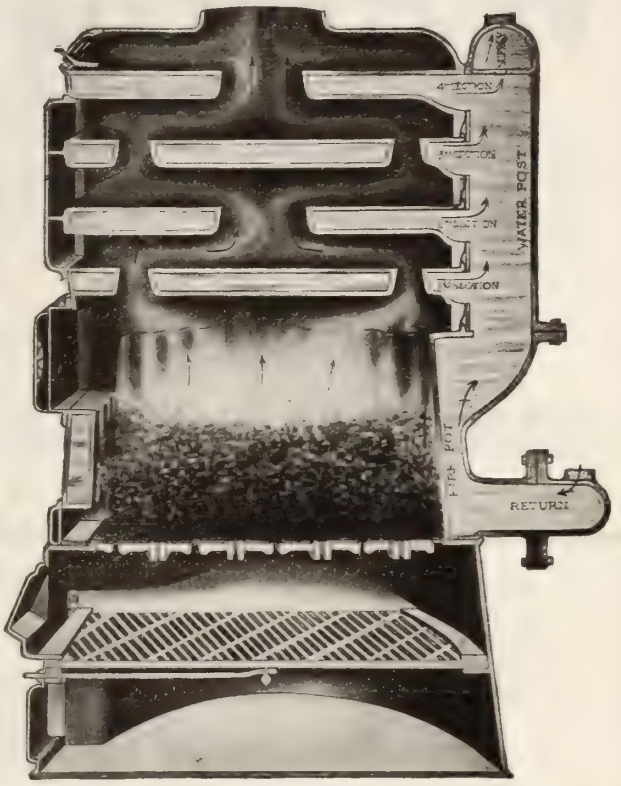
IT is not the boilers which have the largest heating surface that give highest efficiency. But rather the construction of the boiler which assists the water to absorb the most heat units, thus ensuring maximum of service at minimum fuel cost.

STEEL and RADIATION, Limited

Head Office: FRASER AVENUE, TORONTO

304 University Street, MONTREAL **101 St. John Street, QUEBEC**

AGENCIES IN ALL LEADING CITIES



Sectional View "KING" Boiler.

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WROUGHT PIPE

BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED
Montreal Works: Lachine, Can.

STEAM AND HOT WATER HEATING

BY H. C LINCOLN

This book is one of the most simply written books published. It is just the book which the heating engineer needs who has received a limited education.

Postage Paid $1.25

TECHNICAL BOOK DEPT.

MACLEAN PUBLISHING COMPANY, LIMITED

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CLASSIFIED ADS. get right down to the point at issue. If you want something, say so in a few well-chosen words. Readers like that sort of straight-from-the-shoulder-talk, and that is the reason why condensed ads. are so productive of the best kind of results.

CLASSIFIED ADS. are always noticed. They are read by wide-awake, intelligent dealers, who are on the lookout for favorable opportunities to fill their requirements.

TRY A CONDENSED AD. IN THIS PAPER.

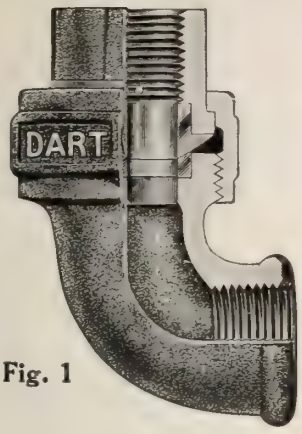


Fig. 1

DART

Union Elbows—Female, and Male and Female

Save Time and Labor

2-BRONZE SEATS-2

NO CORROSION

Heavy Malleable Iron Pipe ends and nuts ensure strength and durability. **Dart Unions stay tight**—they never require readjustment.

Nearly twenty years of successful record is your guarantee of the Dart construction.

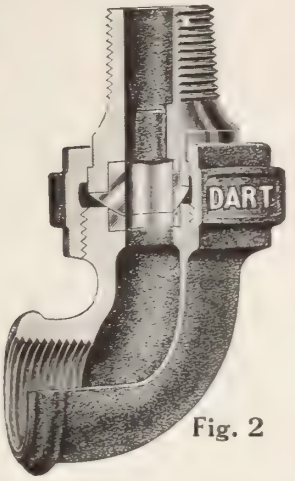


Fig. 2

By the use of Figure 1 you save two threads, do neater work and make sure that the connection is trouble-proof.

Figure 2 is a 4-in-1 fitting. It cuts out nipple and one thread at running end and nipple, elbow and two threads at the elbow end.

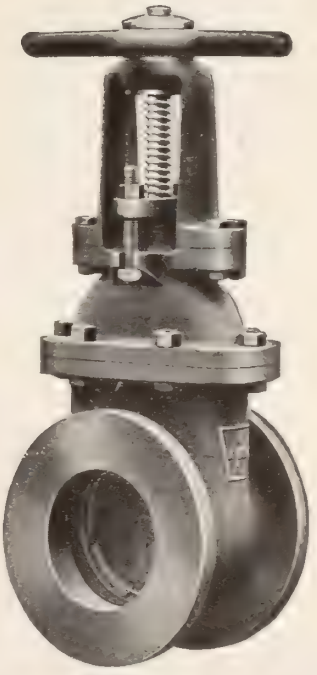
SOLD BY ALL JOBBERS.

Manufactured by DART UNION COMPANY, LTD., Toronto, Canada

There Are Lots of Gate Valves

advertised and sold, but not all of them possess that neat appearance, combined with strength and stability, which characterizes

KERR IRON BODY GATE VALVES



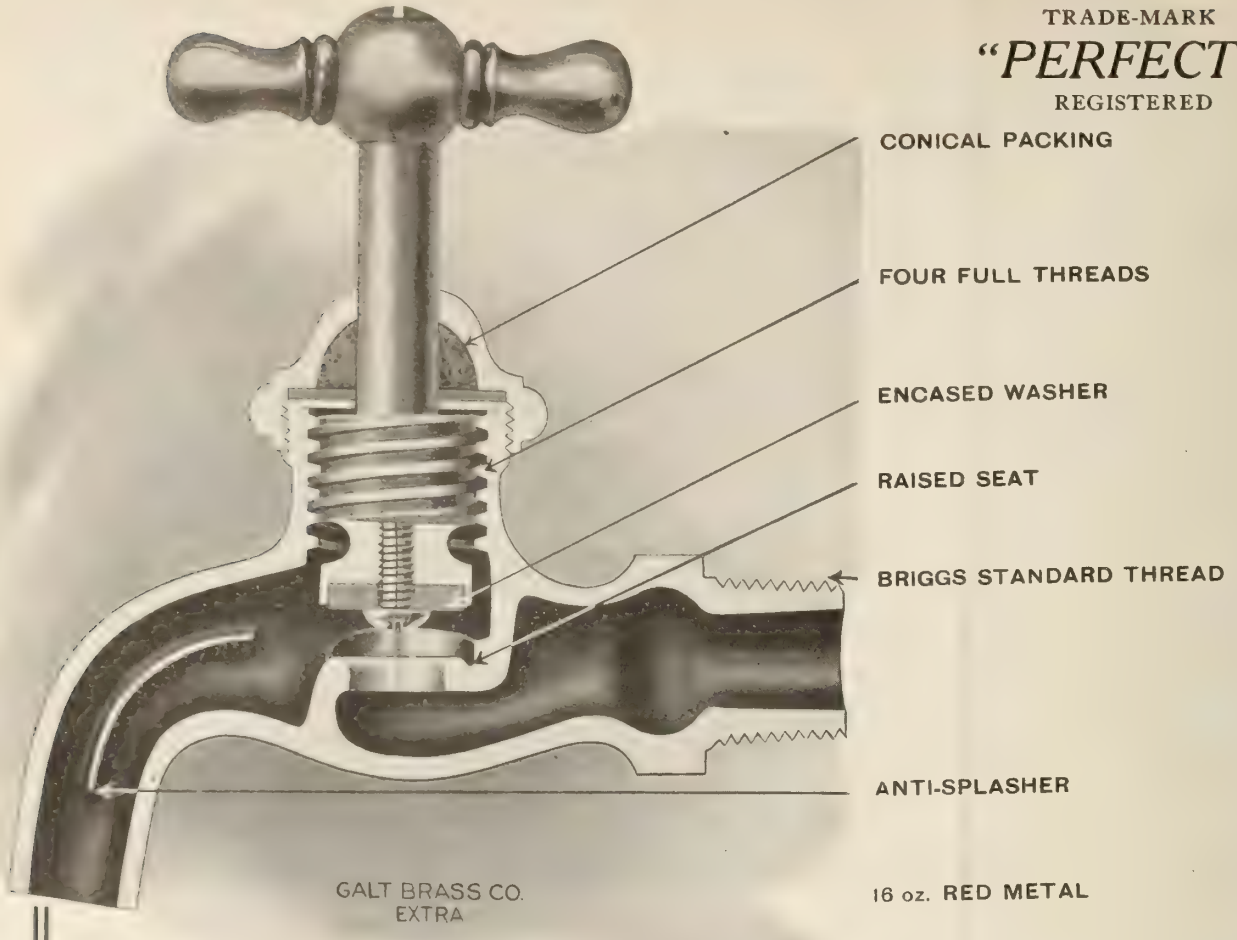
Specify KERR'S (KEYSTONE) Iron Body Gate Valves on your next order, and let us prove what we claim for them.

Our Catalogue No. 5 tells all about them. It is yours for the asking. Write us to-day.

Approved by the Fire Underwriters Association, and Registered by Boiler Inspection Departments of Ontario, Saskatchewan and Alberta.

THE KERR ENGINE COMPANY, LIMITED - Walkerville, Ontario

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having **Double Thread** on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. X | Publication Office: TORONTO, OCTOBER 16, 1916 | No. 20

FILE COPY

A1500

Empire Lavatories

We carry in stock a large assortment of Porcelain Basins; they are unexcelled in appearance and the quality is guaranteed.

These Lavatories, when installed, fitted with our high-grade brass goods, will make you satisfied customers. We give you the opportunity to supply your customer with a high-grade fixture at a reasonable cost.

Empire Drinking Fountains

We can supply a Drinking Fountain to suit all requirements.

A1602

The Fountain shown here has proven to be a favorite with the Plumbing Trade, as it is not only durable and pleasing in appearance, but the cost is reasonable.

Put one of these fixtures in your Show Room, it will attract trade.

Write us for prices.

FILE COPY

Empire Mfg. Co., Limited

LONDON - - - TORONTO

The Goods You'll Eventually Buy

Based upon a quality, second to none; you make no mistake in starting now to supply your customers with BEAVER BRAND White Enamel Ware

Ask your jobber for BEAVER BRAND CAST IRON ENAMEL WARE
and build up your reputation

EVERY DOLLAR WE OWN STANDS BEHIND THE GOODS WE MAKE

Amherst Foundry Co., Limited

General Offices and Factory: Amherst, Nova Scotia

WRITE YOUR NEAREST AGENCY

AGENCIES:

ONTARIO:
Monarch Brass Mfg. Co., 71 Brown St., Toronto

MANITOBA and NORTHWEST:
E. B. Plewes, 120 Lombard St., Winnipeg

CANADIAN CONSOLIDATED RUBBER CO. LIMITED
DOMINION
RUBBER SYSTEM
AND ASSOCIATED COMPANIES

The Merchant who orders Fruit Jar Rings, the Contractor who requires Belting, the Architect who uses Tiling and Matting, or the Engineer whose Valves and Pipes need Washers and Packings, will always find the greatest satisfaction when selections are made from the Dominion Rubber System products, because,

THE QUALITY is dependable, and meets every possible requirement.

THE VARIETY is wide enough to satisfy every possible demand.

THE VALUE, no matter what the price or article, is the best within reach.

THE SERVICE is prompt and satisfactory, and there is no occasion for disappointment.

Back of all is the broad policy of the Dominion Rubber System to serve and please under all circumstances.

Write to our nearest Branch or direct to our Head Office for Catalogue and Prices.

Canadian Consolidated Rubber Co.
LIMITED

Head Office—Montreal, P. Q.

28 "Service" Branches Throughout Canada

Thickness and Thinness

How They Both Count in Burnham Boiler Economy

The right thickness of the casting of each section means the right strength. Uniform thickness means an equal strength at all points. Thick in some places and thin in others, means the section is only as strong as its thinnest spot.

This section shown here of a water boiler is just the way it looked after breaking out the sides to prove to ourselves, as we do over so often, that the castings are being made uniformly thick.

But there's another side to this thickness question and that is: the thinner the iron the quicker it transmits heat to the water. So we have worked out the thickness to a point where it has the right strength and some to spare, but not so thick to hinder quick heating.

Note on this section, that hollow ridge running down the leg coming in direct contact with the hot fire. It's one of the several important points contributing to Burnham economy.

Here, then, are some few of the reasons why the Burnham heats so quickly, circulates so rapidly, burns so little coal, and lasts so long.

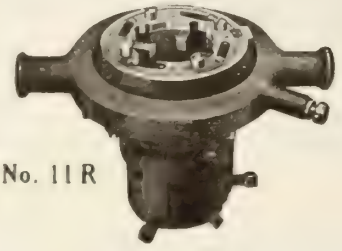
It was designed to do all these things better than other cast iron boilers; and it does them better.

Lord & Burnham Co. Limited of Canada

Builders of Greenhouses and Conservatories

(Boiler Department)

Royal Bank Bldg., TORONTO Factory: ST. CATHARINES, ONT.



No. 11 R

"Jardine" Adjustable Ratchet-Threading Tool

Capacity, ½" to 2", inclusive. Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely covered, excluding chips and dirt.

YOU CAN REDUCE THE LABOR OF PIPE THREADING 50 PER CENT., AND MAKE THREADS AS CLEAN AND PERFECT AS IF CUT ON A LATHE WITH ONLY ONE CUT WITH

"Jardine" and "Toledo" Pipe-Threading Tools

"Jardine" or "Toledo" dies spare the muscle of the man who does the work, and save money for the man who pays the wages, as they enable one man to do the work of two and costs less for repairs. No cams or jimcracks to wear and get out of order. Cutters that cut, don't squeeze. Set of cutters for each size of pipe. Lead screw ensures perfect pitch and form of threads. Adjustable to all variations of fittings, very durable cutters.

All threads finished at one cut. One man does the work of two.

It will pay you to look well into the merits of the "Jardine" and "Toledo" before placing your next order for tools of this kind.

Write for catalog and full particulars.

We'll gladly supply the names if you wish to have a chat with users in your town.

MADE IN CANADA

A. B. JARDINE & CO.

HESPELER, ONT.

Sole makers of "Jardine" Pipe-Threading Tools.
Sole licensees to manufacture and sell Toledo Pipe-Threading Tools in Canada.
Agents, Winnipeg and West—Stanley Brock, Ltd., Winnipeg, Man.
Brockville and East—J. R. Devereux, 233 St. James St., Montreal.

OSBORNE HOUSE, ISLE OF WIGHT
FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

ROYAL PALACE OF LA MAGDALENA
SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN

SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

Standard Sanitary Mfg. Co.
Limited

General Offices and Factory: Royce and Lansdowne Aves., Toronto, Ontario

TORONTO STORE
55-59 Richmond Street, West

HAMILTON STORE
20-28 Jackson Street, West

BALMORAL CASTLE
SCOTTISH RESIDENCE OF THE KING AND QUEEN OF ENGLAND

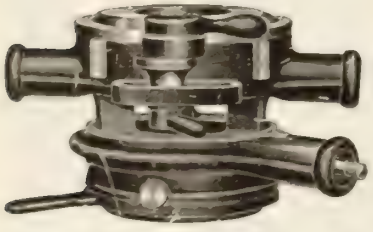
THE QUIRINAL
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ITALY ROME

BUCKINGHAM PALACE
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ENGLAND, LONDON

PALACE OF THE KING OF THE BELGIANS
BRUSSELS

Easy Threading is good Threading

OSTER PIPE-THREADING TOOLS



OSTER NO. 102R

Oster Pipe-Threading Ratchet Die-Stock No. 102R has [illegible] Adjustable guides do away with [illegible] It threads from ⅛ to 1¼ inches.

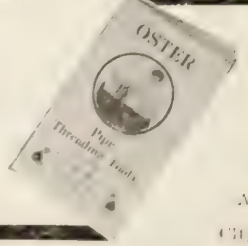
[illegible] No. 90R (1 to 2 inches); No. 91R (2½ to 4 inches); No. 107R (2½ to 4 inches); No. 108R (3 to 4 inches); No. 108½R (4½ to 5 inches); No. 108½R (1½ to 5 inches). [illegible]

A MAN threading pipe with this die-stock can do it without back-breaking labor. The smaller sizes are easily threaded with the tool used, as in the photograph. For the larger sizes he can use the same tool with the ratchet. The ratchet feature also permits the tool's use in cramped quarters. Besides the ratchet it has the 5 big labor-saving Oster features: **(1) Self-locking dies, (2) Self-locking guides, (3) No resetting dies after each cut, (4) No loose bushings, (5) No small parts.**

Oster Tools are saving time and money all over the world to-day by cutting out the useless moves. They are easy to use and easy to get. Dealers in all parts of the Dominion carry Oster Tools.

Send the coupon for a free copy of the complete Oster Catalog and name of nearest dealer.

THE
OSTER MFG. CO.
2084 E. 61st Street
CLEVELAND, OHIO



Please send me the complete Oster catalog showing 47 pipe-threading tools and machines and name of nearby dealer.

Name .....

Company .....

Address .....

City ..... State ..... (2084).

Temporary Withdrawal of Tank Prices

We regret to advise that owing to the failure of the Steel Companies to deliver plate (most of which has been on order for nearly a year) we are forced to withdraw, temporarily, all prices on tanks 36" x 6' and smaller, and on pumping units partly consisting of such tanks.

As soon as the promised shipments reach us, present prices will be resumed. In the meantime, we will be glad to quote you prices based upon our ability to pick up plate from day to day.

NATIONAL EQUIPMENT CO., LIMITED
TORONTO - - ONTARIO

BOOKS FOR SANITARY ENGINEERS

Sanitary Engineering of Buildings

BY

WM. PAUL GERHARD, C. E.

Consulting Engineer of Sanitary Works

Member Am. Public Health Association.
Member Am. Institute of Architects.

103 Illustrations **6 Plates**

Deals with Defective Plumbing and Sewer Gas, Traps and Systems of Trapping, Drainage and Sewerage of Buildings, Plumbing Fixtures, Sewage Removal and Disposal, Improved Methods of House Drainage, Proper Arrangement of W.C. and Baths, Sanitation in Factories and Workshops, Sanitary Drainage of Tenement Houses, Testing House Drains and Plumbing Work, Simplified Plumbing Methods.

A Volume of 455 Pages.

All orders payable in advance. **Price $3.15 postage paid.**

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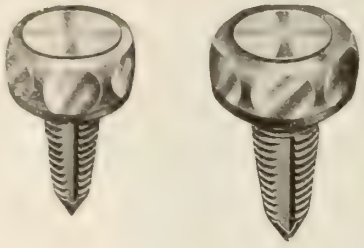
WOLVERINE TAP PLUGS

TOOL STEEL TEMPERED

Cuts and Taps Its Way Through

Milled Slot gives sharp cutting edge.

Threads Machined.



For Repairing Leaks in Boilers, Radiators, Iron Pipe, Fittings, etc.

EASY TO OPERATE

The only tool necessary is an ordinary wrench.
Can be applied without shutting off water or draining fixture.
Head recessed. Gasket cannot blow out.

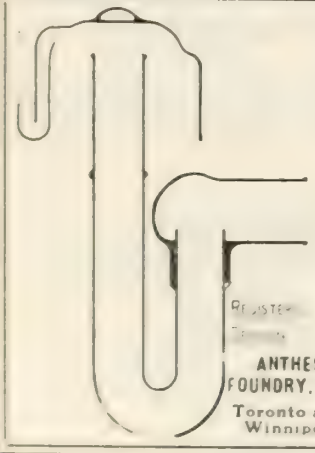
SIX SIZES IN STOCK

A boxed assortment contains a few of each size.

Canadian Wolverine Co., Limited

Manufacturers of Plumbing Specialties, etc.

CHATHAM, ONTARIO



IF IT'S SYPHONS, ASK US

And look at this one. Note the long caulking length.

Ask us about our inside vented syphon. It's a dandy. Saves making many joints.

We unconditionally guarantee every syphon to operate automatically. And it has no moving parts.

Ask your jobber for "Anthes" Syphons and accept no other.

ANTHES FOUNDRY LIMITED

TORONTO and WINNIPEG

Winning the Buyer's Favor

The best possible buyer is not made an actual buyer at a single step.

It is one thing to win the buyer's favor for an article and another to make adjustments incident to closing the sale. Winning the buyer's favor is the work of trade paper advertising.

Under ordinary conditions it should not be expected to do more.

When writing advertisers please mention that you saw their advertisement in the SANITARY ENGINEER."

On Active Service

—One or other of the Famous Five Files will be found on the benches in nearly every workshop in Canada.

The machine shop man likes them for their balance and cutting qualities.

The carpenter chooses them for the same reasons.

The blacksmith prefers them for their rugged strength.

Sixty millions of them are made and used every year.

And they always give satisfaction.

Specify them when ordering.

The Famous Five are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE
(MADE IN CANADA)

The Nicholson File Company
PORT HOPE (Dealers Everywhere) **ONTARIO**

IT'S SIMPLE
TO SELL
TO INSTALL
and TO OPERATE

TUEC STATIONARY CLEANERS ARE BIG BUSINESS BUILDERS

IF WE CAN assist you to make a sale, we are at your service at no cost to you. Send us a few names and we will protect your interest.

MADE IN CANADA

The United Electric Company
159-161 Richmond St. West, Toronto, Ontario

B-O-T Hidden Lock Dovetail Joint

SEE THAT JOINT?

TRADE B.O.T. MARK

It's Made Right. It Holds Tight.

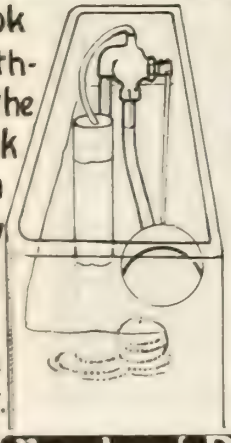
WE DON'T know how to improve the B. O. T. line of W. C. Tanks; if we did we would. Every joint is covered with a **5-year guarantee** backed by every dollar we own.

The only genuine wood, hidden lock dovetailed joint, W. C. Tank on the market.

The B-O-T Manufacturing Co., Limited

159-161 Richmond Street West, Toronto

Noisy Filling a Nuisance



Look Within the Tank You Buy ::: Get The Best.

That's Why Leading Tank Manufacturers Jobbers and Plumbers Are Using More and More QUATURN SILENT BALL COCKS! A Fair Test Will Convince YOU of Rapid, SILENT FILLING! Post-Card Brings Prices!

Wallaceburg Brass & Iron Mfg Co.
Wallaceburg · Ontario ·

The Hotstream HEATS IN A HURRY TRADE MARK REG. —WATER HEATER

PRICE, $1.25

Hotstream Generator

A Real Auxiliary Furnace Water Heater

Placed in an out-of-the-way corner of the furnace it will supply plenty of piping hot water for a 30-40 gallon tank at no extra cost, thus eliminating the use of your gas heater during the winter months.

Composed of eight fan shaped leaves over-lapping at their outer edges. No water way through the centre. A free unobstructed water travel. Nothing to get out of order. No baffle plates or dead arms.

Installed just above the fire—not in it.

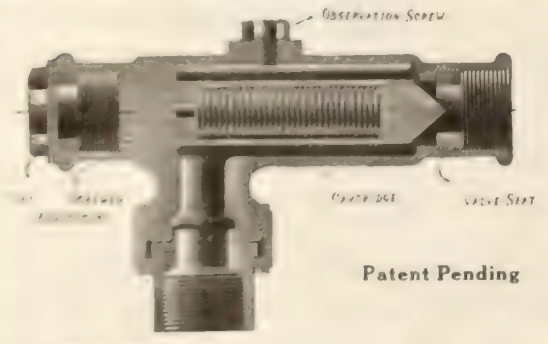
Diameter 7 in.; height 3½ in.;

1 or 1¼ in. water connection.

Put up in a neat parcel post package.

THE HOTSTREAM HEATER COMPANY

Cleveland, Ohio



Patent Pending

The "WELO" Trap is guaranteed to pass air or water freely, but to shut off against steam.

"WELO" TRAPS

For High and Low Pressure Steam, Vacuum or Vapor Heating.

Made in Canada

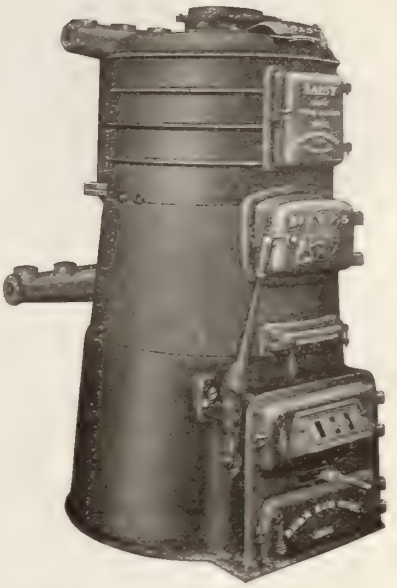
BY

VICI RADIATOR COMPANY

HAMILTON, ONTARIO

THE DAISY BOILER

Over 60,000 in use



Made in 21 sizes, high or low base, heating from 167 sq. ft. of radiation to 4,000 sq. ft. May be built in batteries of any number or size.

We also manufacture

Viking Steam and Hot Water Boilers—

Viking Steam and Hot Water Radiators,

Cast Iron Flanged and Screwed Fittings,

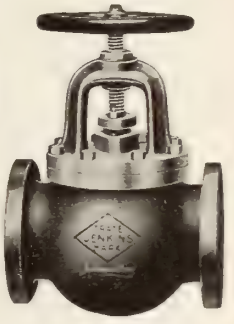
—Soil Pipe and Fittings.

WARDEN KING, LIMITED

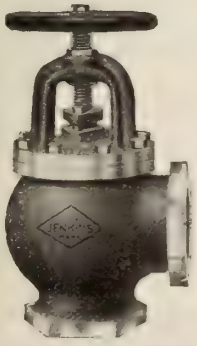
Branch, 200 Adelaide St. West, Toronto **MONTREAL, P.Q.**

Jenkins Bros.' Valves

have the Diamond Trade Mark



The Jenkins Bros.' Standard Pattern Iron Body Valves are generally recognized as being heavier, considerably stronger, and more durable than the average iron body valves on the market. The bodies are carefully designed to insure equal distribution of metal. The yokes are wide, giving easy access to the stuffing boxes which can be packed under full pressure when wide open. Fitted with the new Jenkins Bros.' No. 119 Disc when intended for steam service; or discs of softer pliable composition when specified for cold water or other liquids. Renewable bronze seat rings.



Approved for use in the Western Provinces by the Depts. of Public Works

Write for Catalogue 8.

Jenkins Bros., Limited

103 St. Remi St. **MONTREAL**

SANITARY ENGINEER

PLUMBER AND STEAMFITTER OF CANADA

Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, OCTOBER 16, 1916 No. 20

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UNITED STATES—New York, R. B. Huestis, 115 Broadway, N.Y., Telephone Rector 8971; Chicago, Ill., A. H. Byrne, 1104-5-6-7 Fort Dearborn Building, 105 West Monroe St., Telephone Randolph 3234; Boston, C. L. Morton, Room 733. Old South Building, Telephone Main 1024.

Take It Out!

AND PUT IN A "VITRO"

"NO, I simply can't stand the expense of repairing this old tank any more.

"Bring up a new tank—one of those with the TROUBLE LEFT OUT. I think it's called the VITRO. It must be none but a VITRO."

Sold by every jobber in the Dominion.

Over a quarter of a million VITRO tanks now in use.

AGENCIES:

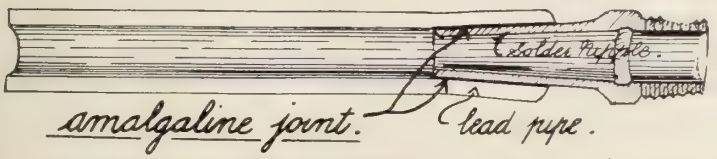
MARITIME PROVINCES—The Jas. Robertson Company, Limited, St. John, N.B.

QUEBEC PROVINCE—Mechanics Supply Company, Limited, Quebec, Que.

Cluff Manufacturing Company, Limited

81-111 STERLING ROAD, TORONTO, ONTARIO

"The Scientific Metal Jointer"



SIMPLE AND SCIENTIFIC

TO MAKE THE ABOVE JOINT you simply drive in the Solder Nipple. Then take it out, file smoothly and clean. Then clean the inside of the pipe smoothly, taking care not to alter the taper inside. Now wrap a piece of amalgaline ribbon round the solder nipple, insert it into the lead pipe, drive tight and warm with blow lamp. Very little heat is required.

SOLD IN 50-FOOT REELS

Amalgaline Company of Canada

186 Manning Avenue, TORONTO

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WRITE US FOR PRICES

AN ASTOUNDING FACT

OUT of 400 farm homes only 10 were fitted up with a complete outfit of plumbing fixtures.

ONLY about 25 had a W.C. in their home and only 65 had water piped to the house in spite of the fact that such appliances are of the first importance and are demanded in a city home.

Farmers Have Money For Luxuries

THE above assertions are proved by the following report recently issued by the Commission of Conservation, from which the following figures are also taken:

86 out of every 100 own farms of 126 acres.
232 of these farmers have a telephone in their homes.
20 are automobile owners,
and 126 out of the 400 have either a horse and buggy or an auto for pleasure.

NOW, Mr. Sanitary Engineer, don't you think there is more need of plumbing fixtures on a farm than an Auto? The auto salesman would not even attempt to side-track such a question with "No." Such being the case it is up to you to go after new business. Sell him a complete sanitary equipment which will make him a more efficient farmer, happier and healthier.

See that you ask for "PORT HOPE" Enamel Ware.
The Goods of Quality and Service.

Port Hope Sanitary Manufacturing Co., Limited

FORMERLY

The Standard Ideal Co.

Head Office:
ROYAL BANK BUILDING, TORONTO

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THE SANITARY ENGINEER

VOL. X. OCTOBER 16, 1916 No. 20

A Discussion on Credits and Discounts

Desirability of Limitation of Credits—Too Easy Credit Frequent Cause of Failure — Overhead Expenses Reduced by More Frequent Turnover — A Case in Point

BY ONE OF US.

Article No. 4

ON this page will be found copy of a letter we have received from the Society of Domestic Sanitary and Heating Engineers expressing approval of the attitude we have adopted towards the question of Credits and Discounts. This letter is typical of many that have been received on the subject, and we, therefore, make no apology for again taking up the matter and endeavoring to convince all and sundry who have the interests of the craft at heart that it behooves them in their own interest to lend their hearty co-operation and support to further any effort which may be made (and that such effort will be made shortly we feel fully convinced) to place the credit and discount question on a solid and satisfactory basis.

Fear of Hampering Business

In face of the many expressions of approval above referred to, it might appear unnecessary to advance arguments in furtherance of a policy which apparently meets with such universal support, but there are some of the craft who fear that any restrictions or limitation of the elastic terms of credit under which they are at present working would unduly hamper them in the conduct of their business, and it is to such as these that the arguments herewith adduced are principally addressed. "It is all very well to talk of cutting short terms of credit," said one man a few days ago, "but how shall I stand if I am expected to pay up my accounts promptly to the minute, and I am unable to get in my own accounts from those that owe me money. Fix up some scheme to compel my customers to pay me, and I am with you heart and soul, but unless you can do this, it seems to me that in supporting your ideas I should simply be tying my own hands and perhaps digging my own grave."

This at first sight seems a perfectly legitimate argument, but we hope to prove it is based upon a misapprehension of what constitutes profitable business, and in the case of anyone who could honestly use this argument it would, without doubt, be found upon investigation that it is his own business methods which are at fault, and these methods should be immediately revised and stricter attention given to the collection of outstanding accounts in any case, whether any scheme such as those suggested be instituted or not.

Toronto, Sept. 22, 1916.

Editor SANITARY ENGINEER,
Toronto, Ont.

Dear Sir,—The Executive Committee of the above Society wish to express their hearty sympathy with the article on Credits and Discounts as printed in the September 1st issue of the SANITARY ENGINEER.

This article covers one of the largest questions, if not the largest, in connection with the success of the sanitary and heating industry of the Dominion, and there is no doubt in the minds of the members of the Executive Committee of the above Society, that it will be on such lines as suggested in the above article, through which our craft will ever be able to arise to its proper place in the commercial world.

Thanking you again, sir, for the valuable assistance always rendered by you and your excellent journal to our craft at all times, and trusting that much good will come out of this article, I beg to remain,

Yours sincerely,
(Sgd.) G. F. FRANKLAND,
Sec. Executive Committee.

Easy Credit Ruinous

It is an undeniable fact that many a man starting in business for himself is ruined by the facility with which he is able to obtain credit. It is usually a case of "**lightly come, lightly go.**" He can obtain credit easily himself and, therefore, unthinkingly undertakes work which he would undoubtedly refuse were he compelled to pay out cash for the materials required in such work. His customer is slow in paying up, and he is, therefore, compelled to ask for an extension of time from the jobber or manufacturer, with the result that his own credit is to some extent injured, and so his troubles begin.

How many a man is heard to say: "If people would only pay me what they owe me I could easily pay all my debts and should be in a comfortable position." This is the crux of the whole question. Whose fault is it they do not pay? Why, yours, of course, because you were too lenient in extending credit. Far better be without business that is going to cause you endless worry and trouble in getting in your money, and will ultimately land you in the sheriff's hands.

Effect Upon Overhead Expenses

Consider the matter from another viewpoint—the effect upon overhead expenses. It stands to reason that if you can turn your money over several times during the year you can thereby considerably reduce your percentage of overhead expenses. This perhaps cannot be better illustrated than by a question which has lately received some publicity in the daily papers—that of the grocer who buys bread at 14c and sells it at 16c. Every tradesman is, of course, entitled to a fair profit on his outlay, but those who contend that the grocer's profit in this case is too small appear to have missed one important point, viz., the frequency of the turnover. Let us suppose a grocer has regular customers for 20 loaves of bread a day, which he buys for $2.80 and sells for $3.20. Now if he only turned over this $2.80 two or three times a year undoubtedly the 40c would not be an adequate profit, but as a matter of fact he turns this same amount over about 300 times a year, and his profit on that $2.80 owing to the fre-

(Continued on page 27.)

Farmers in Want of City Conveniences

The Best Should Be Installed and Installed Right—A Writer in "The Country Gentleman" Published by Curtis Publishing Company, Philadelphia, Would Make Every Farm House a Junk Pile.

BY ONE OF US.

ARTICLE NO. 2.

It cannot be disputed that every farmer, or rural resident needs his home properly equipped with sanitary and heating appliances.

It must be noted that I said properly, and the term "sanitary" is used. Now, what assistance is the farmer being given in his journals?—the papers or magazines which are supposed to have been brought into existence with the sole view of enlightening him on his business.

It is nothing short of scandalous to see such articles published as recently appeared in "The Country Gentleman," a paper published by The Curtis Publishing Co., a concern which no doubt is doing much good in many ways, but by allowing such piffle to appear under the cloak of its reputation is almost like the learned physician who prescribed wrongly and killed his patient. We cannot write too strongly against such articles, mainly because we know that the readers whom the paper in question reaches, know no better. They are being misguided, misinformed in many ways.

One of the chief reasons why plumbing is expensive, or imaginarily so, is because the average person knows very little about it, and the result is many try to "be handy," profess to "know it all," and eventually make a botch of the whole thing.

For the benefit of our readers, we herewith reprint a part of the article:—

"A slate, tile or asbestos shingle roof is desirable if you drink cistern water. The roof should be washed of dust with the first of a shower and the water filtered either through a brick partition in the cistern or a concrete filter box filled with charcoal and gravel. **A brick or concrete cistern holding a thousand gallons will do for a small family and should cost about fifty dollars.**

"In dry sections of the country more water must be stored. A cistern should be built carefully, even though the water is not to be drunk. If of brick, a double thickness of wall should be used for the walls and the inside should be neatly plastered with cement. There should be ventilation and a screened overflow pipe. The top should be arched brick or concrete, with a tight stone or concrete manhole cover. A concrete cistern can be built square and reinforced with metal.

Just read this article and take note what John R. McMahon says in *The Country Gentleman*, Aug. 12 issue.

A Doctor would very soon lose his practice, if he could not diagnose properly at least 75 per cent. of the ills which we human beings are heir to, just as if he prescribed a medicine which did not effect a cure.

It's a serious matter these days for a person to mislead another in any way, what does the good old book say about such men?

"Every prudent man dealeth with knowledge: but a fool layeth open his folly."

And a man who will deliberately try to mislead people who know no better is worse than "Judas Iscariot." It is the duty of every Sanitary Engineer on this continent to rise up and show the farmer, or any other person what is right.

—Editor.

Drilled and Driven Wells

"Wells are of many kinds, costs and superstitions. Open wells are condemned but any well can easily be covered.

"'If you are going to the country this summer don't drink well water.' To which we add: 'If you are going to the city this summer wear rubber gloves and a mask.' I heard of a prima donna in my neighborhood who was charged three thousand dollars to have an artesian well drilled and she had to sing hard for three nights to pay the driller's bill.

"Not far from her location there is a colony of summer cottagers who have no vocal ability, but who drive iron pipes in their cellars with a sledge hammer and the water shoots up, pure and cold, to the height of a second storey. They have short lengths of pipe which screw together. There is a screened point at the bottom and a cap at the top.

"Some rig up a weight on a pulley, which is attached to floor beams, and use this device as a pile driver.

"Any time an old well fails they go down cellar and in a short time sink a new well.

"Ten to twenty feet is the usual distance to water, and the average well costs less than a pair of shoes. The soil is sandy, as it is in other localities where this easy water getting is practised.

"Not far again from these lucky folks a suburbanite has spent $1,500 looking for water, and he is still looking. Some say the well driller drives his casing down in a hurry for fear that water may enter the hole and terminate his profitable labor. It would be a misfortune if the drill hit a vein amidships and the flow could not be shut off.

"If a hand-driven pipe will not fetch water, the next most economical thing is an open dug well. Of all types, it has the best chance of success at a reasonable depth. It commands the underground water over an area of several hundred square feet, compared to the few square inches of subterranean surface tributary to the drilled hole.

"In the same location and at the same depth a drilled hole will be a failure, while an open well, slowly collecting and storing water from a large internal area, is a perfect success. The drilled hole must strike a flowing stream but a well need only gather many little trickles. If the trickling amounts to a constant supply or daily renewal of, say, 200 gallons, we need go no farther.

"Of course, the well should be dug in the dry season and tested for some time as to reliability of flow. A rock bottom is best to hold water. There was a man who found water on such a bottom at thirty feet, ambitiously piereed it and stopped in sand ten feet below, whence all the liquid drained away and a good well was lost.

"The open dug well need not be insanitary, professor, for we intend to seal it against all surface contamination. There are several ways in which this can be done. The interior may be lined with tile or concrete pipe cemented at the joints, the outside filled with earth and the top concreted.

"A suburban amateur improved on this by creating a large sealed reservoir of tile and stone at the bottom, and running up a six-inch tile, surrounded by earth, to contain the well pipe. Incidentally, he planted a concrete cistern on top of the well and had the whole business conveniently placed in the basement under the kitchen. The work was done, of course, before the house was built. The well reservoir is composed of four two-foot tiles with open joints and with stones laid round the outside; its top is sealed with concrete, through

which small tile containing well pipe runs through earth and the cistern bottom to the surface. The small tile is, of course, cemented.

"An open dug well thirty to forty feet deep, with not too much sand to need casing or rock for much blasting, will cost about $125.

"**To distribute water from well or cistern through the house, there is first the hand force pump. This will send it into an attic or ceiling tank.** The pitcher pump does not send it up and away A separate pump is needed for well and cistern; a check valve at the bottom of each pipe will keep up a column of water and save trouble.

"A pair of force pumps may be handily placed at each end of the kitchen sink, one for well water and the other for cistern water, which may be pumped into a small tank for bathroom and other supply. A check valve in the tank pipe makes filling of the tank a simple matter of turning the kitchen tap and working the handle.

"**A refinement of this method is to have a steel tank in the cellar and pump the water into the tank against an increasing air pressure.** When enough pressure has developed, the water will be ready to flow from any faucet in the house. **A small hand outfit of this sort costs about forty dollars.** Attach a gasoline engine or an electric motor and you have a complete independent system of running water.

"The plant may be even automatic, stopping and starting itself, working the pump to keep the tank filled and maintaining a fixed air pressure to distribute the water. **The simplest form of engine and tank cost about twice as much as the hand outfit.**

"Instead of storing water in a tank, another system forces air into a well, operates a pump and makes the water climb up and through the service pipes The water arrives fresh from the well and is not staled by storage.

"When a faucet is opened anywhere in the house, the pump starts working, using the stored energy of compressed air. Power must be used to operate this system. With a dynamo connected with a public-service wire or a private line of current, the plant is absolutely automatic.

"**Plumbing and sewage disposal have in these latter days become so abstruse, complicated and costly as to flabbergast civilized man. It is time to revolt against hocus-pocus and get back to ancient but sound simplicities. The plumber sits on our necks with solemn axioms such as 'All lead joints wiped,' or 'No fixture without a vent.' He wipes and vents at seventy-five cents an hour and fairly plumbs us to death.**

"**A screwed-up joint on threaded galvanized pipe will ofttimes do instead of wiped solder on lead, and it can be made by any handy man with a wrench.** Let traps be threaded. **Vents are not needed except on the larger fixtures.** An inch-and-a-quarter waste pipe for a kitchen sink will serve; if clogged, use suction cleaner or chemical. **Iron vent, waste and soil pipes may be joined with cement — a little oakum in the joint first—instead of calked with lead. A soil pipe may be cemented tile instead of calked iron. If these be heresies let the plumbers make the most of them.**

"The plumbing equipment for a small bathroom can be bought for about fifty dollars and installed for a fraction of that amount by a handy man using practical methods; a plumber would charge two or three times as much.

"Where there is lack of water the "sanitary indoor toilet," with chimney ventilation, is safe and convenient.

Modern sewage disposal is scientific largely because we have put names to the practice of our grandfathers. The old cesspool with the oceanflows near the surface gave roughly the same scope to the beneficent labors of aerobic and anaerobic bacteria as the modern double tank, siphon and tile outfit. On a sandy slope the old style is quite satisfactory.

"Otherwise, the new system may be built very simply, consisting essentially of two square chambers of concrete, one large for the solid matter and the other small to take the overflow and distribute it through the tile branches. A few parts, such as a siphon, may be bought from a manufacturer, or the entire affair may be made on the premises by anyone familiar with concrete work. Fifty dollars should cover the cost."

It would be interesting to know where a concrete cistern holding "a thousand gallons of water can be purchased for $50." This tank would have to be about 5 ft. x 5 ft. x 6 ft. deep, with a cover. The walls would have to be at least 9 inches thick and the whole would have to be made watertight.

Of course, it might be built for that sum if two of the walls were part of a corner of the house, but this would be bad practice. If bricks, and a hole dug below the frost, the hole would require to be anywhere from 8 to 12 feet deep, according to climate and depth of tank. But the writer of the article goes on to say: "In dry sections of the country more water must be stored." which would require, of course, a bigger cistern.

Again he says, "to distribute water from well or cistern through the house, there is first the hand force pump. This will send it into an attic or ceiling tank."

Our "expert seems to have no idea that the highest authorities have long ago condemned the attic tank, particularly when the water is to be consumed, and the attic tank, if sufficiently large, is, from a technical standpoint a very undesirable contraption, and costs far more than "a refinement of the attic tank," as our "expert" terms the steel pneumatic tank. This hand outfit would only cost "about $40." Just imagine $40 for such an outfit. It must be one of those "mail order" outfits of junk, which are forever going out of order, take ten times the energy to operate and blow up once in a while killing the operator.

Such appliances are proving a menace throughout both Canada and the United States.

Our "expert" then quotes about twice $40 for a "simple form of engine." It must be "simple" for that price, but the upkeep is another question—repairs, batteries, oil, etc., or, if an electric motor, a few "short circuits" now and again.

And then our "wise one" begins a tirade on "the plumber," devoting considerable space to the evils of "the plumber, who "sits on our necks," etc. It's too bad the plumber could not sit on his mouth, but then it would only be like stopping up one of those penny balloons, "nothing in it but wind." and the proof of our assertions is found in the fact that our "wise one" goes on to say that "vents are not needed except on the larger fixtures," when in actual fact, the w. c. in a house of one bathroom is very seldom vented in many cities now. It is the smaller fixtures, if any, that really need to be vented.

Again doth our "source of wisdom" try to mislead the "fellow who knows no better" into believing that "soil pipes may be joined with cement, a little oakum in the joint first."

Is it not painful to see such a statement in print? And particularly so when the paper containing the article is published by such a reputable house as The Curtis Publishing Co.

The reference to tile pipe being used instead of cast iron pipe for soil is too misleading, and in spite of the fact that tile pipe manufacturers all over the world are throwing their good money away in advertising what they try to prove, but cannot, that tile pipe is superior to cast iron, the latter holds sway and is proving to be the most reliable. In conclusion re this latter. If the writer of the article which we have quoted from only knew more about even tile or cast iron pipe, he would be convinced that both are best in their particular sphere. Cast iron would never do in many cases, neither would tile take the place of conditions where cast iron is best fitted.

The question of sewage disposal referred to by the "wise one" is another proof that he knows very little about it, or else he is nothing short of a wilful prevaricator, and dispenser of false statements.

PRACTICAL SHEET-METAL WORK

THREE PIECE ELBOW WITH GUSSET OR GORE PIECE.

BY THOMAS STANFIELD

THE following is a continuation of the definitions and terms, which it is necessary to understand before entering upon the actual development of patterns.

Quadrilaterals

A quadrilateral is a plane figure bounded by four straight sides not necessarily the same length, nor need any of them be parallel to each other.

Trapezium

A trapezium is a four-sided figure, no two of which sides are necessarily the same length, though it is usual to restrict the term "trapezium," to a quadrilateral which has two of its sides parallel.

A Rhombus

A rhombus is a four-sided figure having all its sides equal in length, and its opposite sides parallel but its angles are not right angles.

A Square

A square is a four-sided figure which has all four sides equal in length and its angles all right angles.

A Parallelogram

A parallelogram is a four-sided figure having its opposite side parallel and consequently equal. This term is usually applied to a figure the length of which is greater than its breadth. If all it angles are right angles, the figure is then called a rectangle.

A Circle

A circle is a plane figure consisting of one line which is called the circumference and is such that all lines drawn form a certain point within the circle to the circumference are of equal length. This point is called the centre, and any line so drawn is called a radius of the circle.

A Diameter

The diameter of a circle is a straight line drawn through the centre of the circle and terminated both ways by the circumference.

A Semicircle

A diameter divides the circle into two equal parts, each of which is a semicircle.

Note.—The words 'plane figure' are used in these articles to denote a figure which can be drawn on a plane or level surface.

A Polygon

A polygon is a many-angled (and consequently a many-sided) plane figure, bounded by straight lines, and is used particularly in referring to figures having more than four sides.

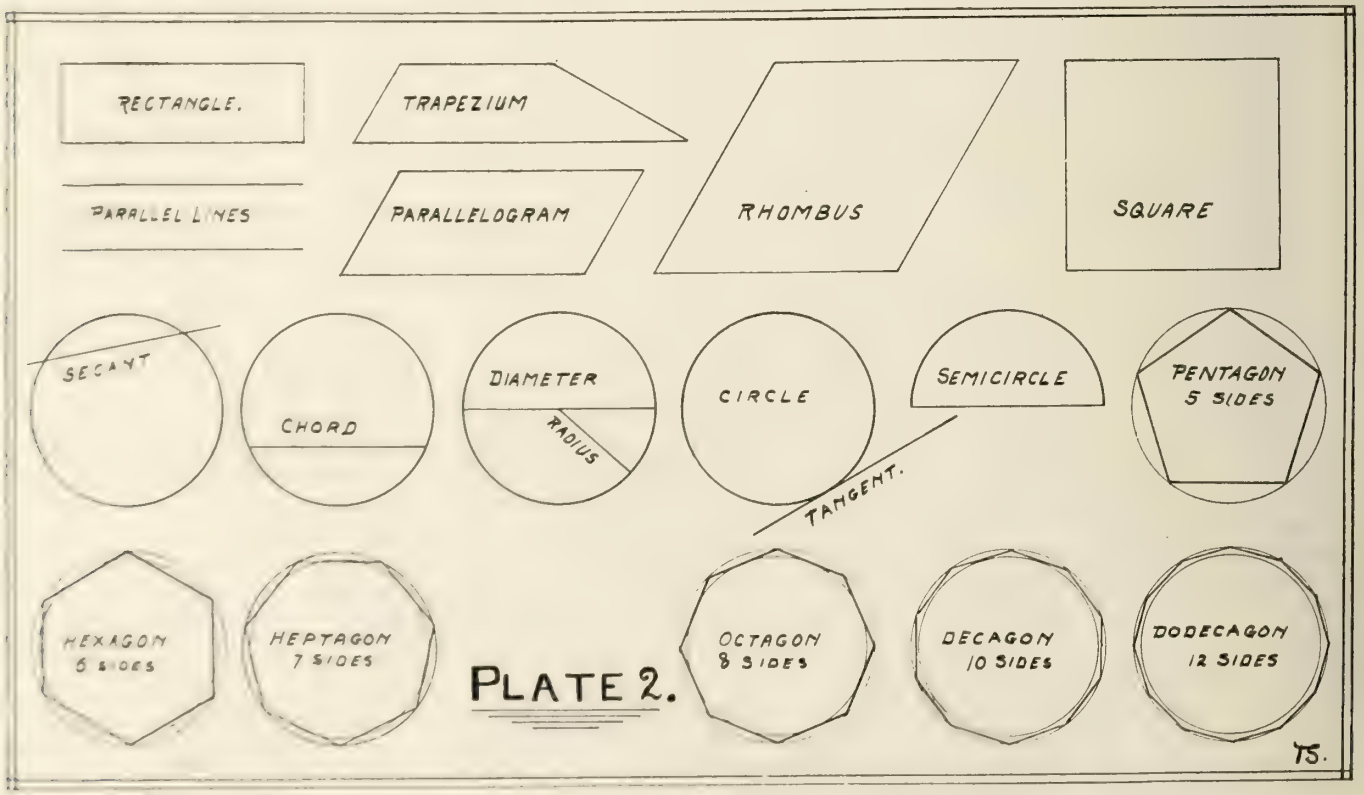
A pentagon is a plane figure having five sides and consequently five angles. If all the sides are equal it is called a regular pentagon.

A hexagon is a plane figure consisting of six sides and six angles.

A heptagon is a plane figure consisting of seven sides and seven angles.

An octagon is a plane figure consisting of eight sides and eight angles.

(Continued on page 27.)



Rural Sanitation

A Continuation of the Sanitary Science Course That Has Been Appearing in the Sanitary Engineer, But Having Particular Reference to the Sanitary Disposal of Household Wastes in Unsewered Districts.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 12.

GRADES FOR SUB-SURFACE IRRIGATION SYSTEMS

House Drains.

Matters relating to sewers, sewage, and sewage disposal were really never given serious consideration until the last century. In the early days, while it was recognized that sewers were necessary, their construction and maintenance were left to the lowest type of laborer. It has been stated that up to a few years ago defective house drains, laid under such early primitive conditions, were still in use in some British houses.

Sewers were not considered a subject fit for discussion and much less for scientific investigation. And it apparently never occurred to the laborer engaged in their construction that they might be laid to a grade which would make them self-cleansing. The method was to sweep them out at certain periods or probably very frequently to leave dirty what were generally ill-constructed sewers.

But now within the last fifty years all matters relating to sanitation have been receiving more and more attention. Respecting sewers, various experiments (though not as yet enough to give complete information) have been made to determine the relation between the size, shape, and grade of sewer, and the depth and velocity of sewage required to keep the sewer automatically clean by means only of the flow of sewage.

Balwin Latham, who made observations in these matters, gives as the result of his experience that in order to prevent deposits in small sewers of from 6 to 9 inches diameter, a minimum velocity of 3 feet per second should be secured when the sewer flows full or half-full. But a small house drain cannot be counted on to always flow even half-full, and the velocity decreases rapidly as the depth of sewage in the pipe decreases. As the velocity in a given drain depends on, and increases with, the grade, it would seem that a grade steeper than that which would cause a flow with a velocity of 3 feet per second should be secured, if house drains are to be self cleansing.

A simple rule for calculating a suitable minimum grade for house drains is to provide a fall of one foot in the number of feet found by multiplying the diameter of the pipe in inches by ten. Table 2 has been constructed in accordance with such a rule, the grades being also shown as percentages and in inches of fall per foot.

Smaller sizes than 4-inch are not given. While a 2-inch pipe would probably carry off the sewage from the average house, experience has shown that the danger of obstruction grease, cloths, etc. is too great in such small drains. While plumbing regulations are in force the size of the house drain is a matter of law; the writer does not know of any case where a house drain less than 4 inches in diameter is permitted. The grades given in the table provide in each case for an approximate velocity of 4½ feet per second when the house drain is running half full or full. Experience has shown that such a grade provides sufficient velocity to keep the house drain or sewer clean even when it runs less than half full.

TABLE 2.

Diameter of Pipe.	Fall of 1 foot in	%	Fall inches per foot.
4 inches	40 feet	2½	3/10 or approx. 5/16 inches
5 inches	50 "	2	6/25 " 1/4 "
6 inches	60 "	1 2 3	1 5 " 3 16 "
8 inches	80 "	1 1¼	3/20 " 5/32 "

A fall of ¼ inch to the foot is generally considered a sufficient fall for a 4-inch house drain from house to settling tank. The same grade is frequently required and advised for larger house drains. It is not necessary to have the septic tank constructed at any great distance from the house; if other conditions are favorable there can be no sanitary objection to placing it right at the house. A saving in material and labor is thus effected, while the shorter the drain the less likely it is to become clogged, if such a danger exists, or frozen, if laid above the frost line.

Too steep a grade (say a fall of over 2 or 3 inches per foot) is as objectionable as too little. The too rapid flow of sewage in the pipe from house to settling tank may leave grease or possibly other solids deposited therein, and eventually cause trouble. If it is impossible to reduce the grade, soda or lye used in the sink have been recommended to cure the grease trouble. Both these substances are alkaline. Bacteria cannot thrive in an acid medium, but do their best work when the sewage is at least slightly alkaline. The addition of such substances would therefore seem to be an advantage, provided sufficient quantities are not used to make the sewage strongly alkaline, in which case, just as if acid were added, the sewage is made antiseptic, the bacteria killed and bacterial action stopped.

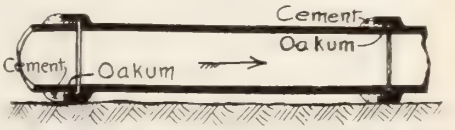


FIG. 47—VITRIFIED CLAY PIPE LAID WITH OAKUM AND CEMENT JOINT

Grades for Main from Flush Tank.

The main leading from the flush tank is generally of vitrified clay pipe of at least 4 inches in diameter, cemented at the joints so that it is water tight. To help insure the condition of water tightness oakum may also be used (see Fig. 47).

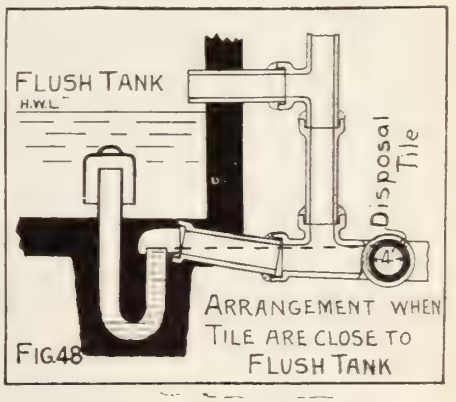


FIG. 48 ARRANGEMENT WHEN TILE ARE CLOSE TO FLUSH TANK

The conditions governing permissible grades of the main leading from flush tank to the sewage disposal tile are somewhat different from those determining the grades of the drain from house to settling tank. Under favorable con-

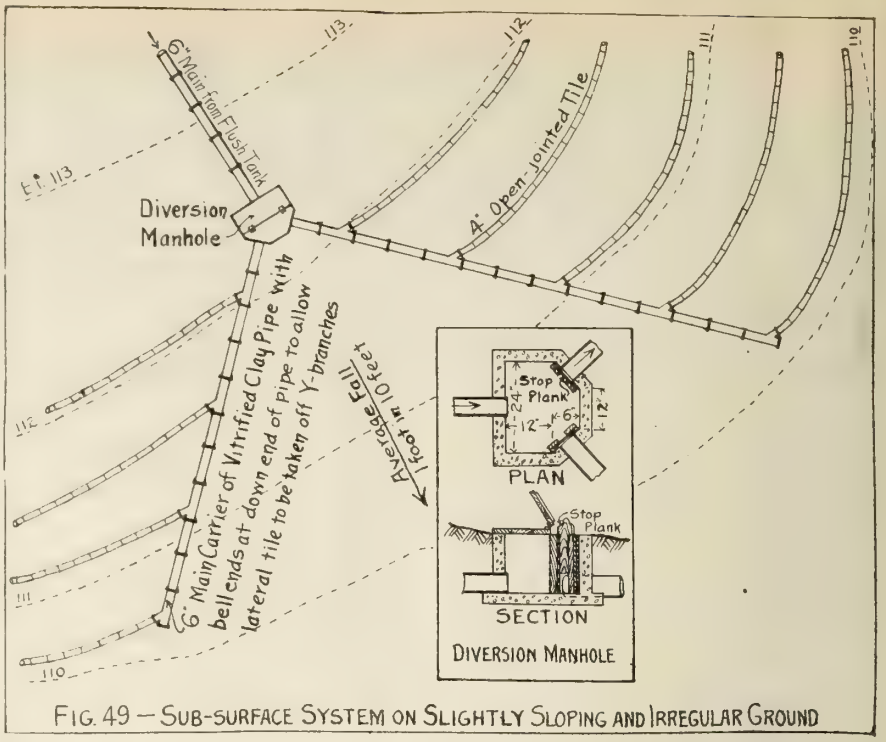

6" Main from Flush Tank
Diversion Manhole
4" Open-jointed Tile
6" Main Carrier of Vitrified Clay Pipe with bell ends at down end of pipe to allow lateral tile to be taken off Y-branches
Average Fall 1 foot in 10 feet
Stop Plank
PLAN
SECTION
DIVERSION MANHOLE

FIG. 49 — SUB-SURFACE SYSTEM ON SLIGHTLY SLOPING AND IRREGULAR GROUND

ditions the sewage flowing from the flush tank contains no grease, paper, or solids of any size, as these are retained in the settling tank. There may be, however, some finely divided particles in the sewage, but these generally remain suspended in the liquid. They are seldom deposited, especially as the full flow from the syphon fills well the main at each discharge.

Maximum Grade

The main may be laid with as much fall as the lay of the land requires. But if steep grade has been given to the main, then before approaching the disposal or absorption field, the grade should, if possible, be reduced to not greater than 4 inches in 100 feet, or a 1-3⅓ grade. The object of such a measure is to so sufficiently reduce the velocity of sewage flowing into the disposal tile system that a uniform distribution results. Without this reduction in velocity one or two runs of tile might be flooded and the sewage forced to the surface of the ground, while other runs would receive little or no sewage. It is recommended that the point at which the main should begin to be laid at a grade not eexceeding this 1-3⅓ grade should be at a point at least 20 feet before the main reaches the absorption field.

Minimum Grade

There should be sufficient fall to allow the sewage to flow quickly away from the flush tank without hindering in any way the action of the syphon. To fulfil this condition it is advisable that whatever the grade, there should be a fall in the main of but little less than (for practical purposes equal to) the diameter of the disposal tile. Otherwise, if the system is filling rapidly with but little immediate seepage from the open joints, the operating head of the syphon may be somewhat reduced and full flow impeded. Fig 48 illustrates in a general way the desired arrangement when the disposal tile are taken off the main close to the flush tank. It will be noted that the lip at the outlet of the syphon is just at the elevation of the top of the nearest disposal tile, so that there can be no back pressure on the syphon to hinder the flow (provided, of course, there are sufficient tile to accommodate the full capacity of the flush tank).

The advantage of insuring that the syphon by such an arrangement cannot be hindered at all in its action might be considered of sufficient importance to be advocated in every case. It is not necessary, however, when the length of the main is sufficient to give the required drop or fall. The grade advised for a 4 or 6 inch main carrier is not less than one foot in each hundred feet, a 1 per cent. grade, or a fall of about ⅛ inches to the foot. If 4-in. disposal tile are used it is evident that at this minimum grade about 30 feet of main would be needed to give the required fall. For a grade of ¼ inches to the foot only 15 feet of main would be required. The necessity then for such a provision as shown in Fig. 48 may not often occur. It is mentioned as being one of the points worthy of consideration in the design of sewage disposal plants when the disposal tile are taken off the main close to the flush tank.

Grades for Disposal Tile.

Runs of tile are preferably not over 50 feet in length. The sewage flushed into each run of tile should be uniformly distributed throughout the length, and gradually escape in equal amounts from the open joints. Therefore the tile making up the runs should evidently, for the purpose desired, be laid as nearly level as possible. As it is a practical impossibility to lay a level line of tile, and to insure that whatever grade there is should be in the right direction, a fall of about one inch is allowed if the length of the run is 50 feet. If the grade is too steep sewage might flood the surface from the lower parts of the runs of tile.

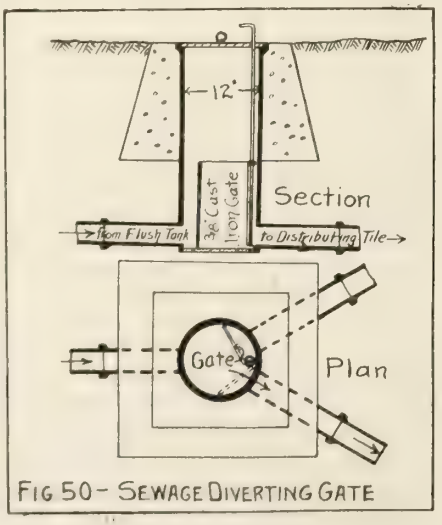


FIG 50 — SEWAGE DIVERTING GATE

Uneven Ground.

Where possible, a level ground surface is, of course, chosen for the sewage disposal tile bed. The lay of the land does not always permit of this, and different methods have been devised to arrange the main carriers and disposal tile, so that the sewage can be delivered evenly over the whole system.

Even on level ground it is an advantage, when the system is of any size, to have at least a few grade stakes planted by a competent civil engineer or surveyor. With these stakes the tiles can be laid at the correct levels. Where the ground is very uneven, it is even more necessary that an engineer should be employed to take levels over the proposed site of disposal bed. From these levels the topography, or lay of the land, can be represented on a map by means of contour lines, and then with such information the best lay out of the bed can be designed and grade stakes properly located on the ground. A contour is a line along which all points on the surface of the ground are at the same elevation or level. In Fig. 49 contours are represented by dotted lines; the number along each dotted line gives the re-

(Continued on page 27.)

Problems for the Board of Health

It is Just as Essential That Plumbing Fixtures be Properly Installed as That Medicines be Properly Dispensed—Poor Installations Made up by the Inexperienced and Unpractical Person is Responsible for 90 Per Cent. of Unnecessary Repairs.

IF any member of the public were to enter a drug store and ask for 5 or 10 cents worth of carbolic, or any other chemical of a like dangerous nature, the chemist would be required to get a signature from the purchaser, and would also be expected to inquire for what purpose the chemical was to be used. In fact, the chemist would without doubt take every precaution possible to satisfy himself that the purchaser knew the nature of his or her purchase, and also knew how to use it.

Such precautions, no doubt, have been the means of saving a great many lives, and it is the various boards of health and medical fraternity who deserve credit for the existence of such regulations. There is, however, another matter which should not only be of interest to the boards of health, but to the general public as well. Sanitary and heating engineers, hardwaremen and mail order houses will or should be also interested in this matter.

In spite of the many progressive strides which have been made in sanitary matters, beautiful fittings and improved methods of installing up-to-date fixtures, there is still much to be done in another direction. At this date mail order houses sell w.c.'s, lavatories, baths, fixture waste traps, etc., as also do hardware merchants.

Now, we find no fault with anyone selling whatever they can, provided no menace is constituted by such sales. But here we have transactions taking place which are a serious menace to the public welfare, and, indeed, are in actual fact becoming more serious every day.

Every city and incorporated town has some kind of plumbing ordinance in force, but the great trouble is to enforce these ordinances, and why? Here is the reason: A mail order house ships or delivers any of the fixtures afore-named to any person who pays the price. So do hardwaremen, and no questions are asked as to who is going to install them, and whether they are going to be installed by a practical man in accordance with the by-laws in force in the various localities.

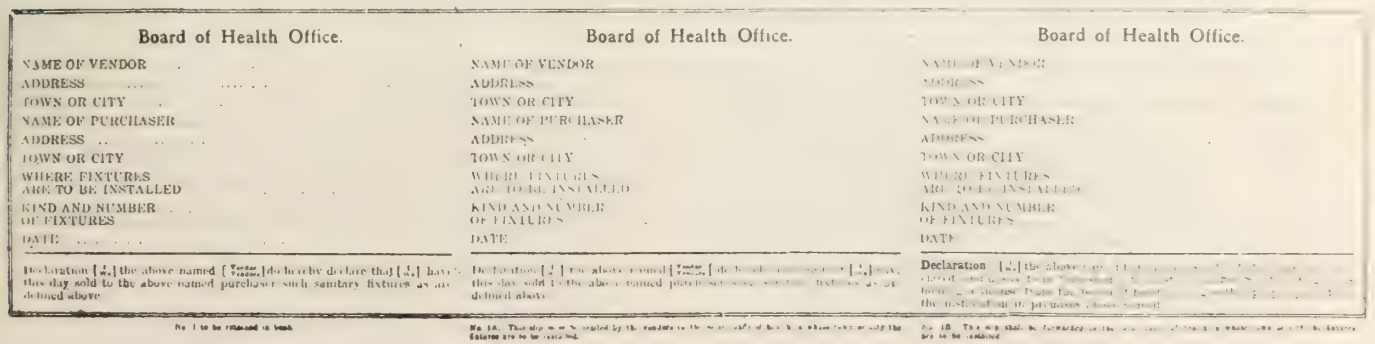
The question is never mooted in any shape or form. It is of no interest to those merchants whether the atmosphere in the homes or buildings become polluted or not as a result of the fixtures not being properly installed. All that is of any importance to them is to sell all the fixtures they can so as to make a profit. As far as the hardware merchants are concerned, we do not think the question has ever been brought to their notice. They are purely and simply merchants, and very seldom are they interested in sanitary engineering construction, except such of them as have a sanitary engineering department in connection with their business. With the mail order house it is another matter. They go so far as to guarantee to show "how simple" a matter it is to install sanitary fixtures, and prepare illustrations of piping and fixtures showing what the various installations will look like. These illustrations are as crude as possible, and prove at the start that they (the mail order houses) know very little how the various fixtures should be installed and care less, so long as fixtures can be disposed of.

There are several conditions which make it possible for merchants, jobbers, and mail order houses to sell these plumbing fixtures to irresponsible persons. One is that there is no provincial by-law in force; or if there is, there is not the necessary machinery in operation to enforce it.

The next condition is that on an average almost any person can procure a plumber's license, irrespective of practical qualifications.

In view of these conditions, which cannot be overcome in a day, we are convinced that all persons, jobbers, manufacturers, hardware merchants, and mail order houses should be held responsible for the proper installation of all fixtures which require to be connected to any public sewer or waste pipe which terminates at a public sewer, providing such fixtures are sold directly to persons who do not hold either a certificate of competency from some existing board of examiners or a license from the local board of health.

Or else, all jobbers, manufacturers, hardware merchants and mail order houses should be furnished with books in triplicate in which to record each and every sale of such fixtures when not sold to such authorized persons aforenamed, one slip to be forwarded to either the local or provincial board of health, the other slip to the buyer, and the third slip be retained. Each of these slips should bear the same number. We herewith show fac-simile of a slip in which the above-mentioned suggestion is carried out. If some such measure were adopted, the public would be safeguarded; the "botch plumber" would be a thing of the past, and the legitimate trader would receive his just due.



Board of Health Office.

NAME OF VENDOR
ADDRESS
TOWN OR CITY
NAME OF PURCHASER
ADDRESS
TOWN OR CITY
WHERE FIXTURES ARE TO BE INSTALLED
KIND AND NUMBER OF FIXTURES
DATE

Declaration [I,] the above named [Vendor,] do hereby declare that [I,] have this day sold to the above named purchaser such sanitary fixtures as are defined above

No. 1 to be returned to book

Board of Health Office.

NAME OF VENDOR
ADDRESS
TOWN OR CITY
NAME OF PURCHASER
ADDRESS
TOWN OR CITY
WHERE FIXTURES ARE TO BE INSTALLED
KIND AND NUMBER OF FIXTURES
DATE

Declaration [I,] the above named [Vendor,] do hereby declare that [I,] have this day sold to the above named purchaser such sanitary fixtures as are defined above

No. 2. This slip is to be supplied by the vendor to the purchaser of fixtures when sold. The fixtures are to be installed

Board of Health Office.

NAME OF VENDOR
ADDRESS
TOWN OR CITY
NAME OF PURCHASER
ADDRESS
TOWN OR CITY
WHERE FIXTURES ARE TO BE INSTALLED
KIND AND NUMBER OF FIXTURES
DATE

Declaration [I,] the above named

No. 3. This slip shall be forwarded to the [illegible] when sold. The fixtures are to be installed

THE SANITARY ENGINEER

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OCTOBER 16, 1916

THE QUACK PLUMBER

IF one were to look about and try to find out what manner of person is the direct cause of most of our troubles, we should find that it is the person who professes to possess a knowledge of things which he really does not.

He is a "professor of knowledge" not a "possessor of knowledge," Such men can be found in all manner of occupations, they are responsible for at least 25 per cent. of the cost of upkeep in all lines.

Take the moulder in the foundry who does not know why one kind of mould may be rammed harder than another. The brass finisher that does not know the grade of wheel he should use of certain kinds of metals, and the carpenter who does not know how a floor should be laid.

50 per cent. of our floors do not last the time they should because in many cases the board has not been properly cut in the first place.

And the plumber, or as he is now known, at least in Canada, the sanitary engineer, what of him? It would be safe to say that in spite of the "Quacks" in our line, we rank as high if not actually higher than any other skilled artisan. But sanitary engineers are not protected as are most other trades. Their time is unnecessarily wasted by the public, and the public only see the price in plumbing. Some hardwaremen are handy men to make easy repairs, and they are right in so doing, but when men install plumbing fixtures in the way some do, particularly in farm homes, a great injustice is being done to the tradesmen as a whole and to the farmers in whose homes such work is done. On another page is a suggestion, showing how all plumbing fixtures could be watched, and that if a purchaser of such goods attempted to have them installed in an unpractical manner, he could be made to have them torn out, or properly installed.

This may sound very obnoxious to many, but here is the main point. A farmer is told that he can buy good reliable fixtures to fit up his bath room for a certain sum, that he can with a wrench install the whole lot himself.

What is the result? Goods are nine times out of ten a poor grade of goods, heavy cost of repairs, improper installing accounts for unnecessary repairs, pipes get blocked up, leaks appear under floors, in dark corners, and become breeding places for all kinds of filth, and finally a plumber has to be called in.

If it is necessary to have plumbing inspected in our town or city home, why not in the country home? If the city dweller must have his plumbing passed by an inspector why not a farmer. We venture to say that if in our cities a house to house inspection of all plumbing were instituted that the "Quack" plumber would soon be out of business. He it is that is responsible for 40 per cent. of the repairs. There is no reason in the world why plumbing fixtures should get out of order as frequently as they do, but what is the reason? People are being advised to "Install their own plumbing," install "cesspools." "They were good enough for our forefathers," say some of our "know alls". It might be of interest to those "know alls" to know that if our forefathers had been a little more careful tuberculosis would not have been what it is to-day "The white plague." Typhoid would have been an unknown quantity, and a host of other diseases that are nothing but the result of the filthy habits of our forefathers would have been non-existent.

Of course they did not know any better. But we do know better, we do know that 90 per cent. of our ills are caused by unsanitary conditions, polluted air, polluted ground and polluted water.

There can be just as great a menace created by plumbing being improperly installed as if a family or member of a family were to take a slow poison out of a bottle. And if the public could be educated to the fact that a "botch plumber," "a handy man

with a wrench" is in other words doling out slow filthy poisons when he installs plumbing fixtures improperly, they would find fewer repair bills, less annoyance from leaks and leaky taps, etc. The latter are responsible for millions of dollars worth of wasted water, which costs a lot of public money. All these arguments should be used by the honest sanitary engineer when he is trying to compete with the handyman, the quack plumber.

MARKET QUOTATIONS

SOME two years or so ago we published to some extent the prices of goods, etc., in THE SANITARY ENGINEER, but as reliable discounts and several other matters were almost impossible to procure, it was felt that the department should be discontinued.

However, we have again started a market page in this issue and will as far as lay in our power publish accurate statements on this page every issue. Such prices being in effect at the time the THE SANITARY ENGINEER goes to press.

We feel that this service will eventually prove of great value to our readers. We will only be too pleased to do all we can to make this feature of service.

We will be glad to receive any suggestions as to how THE SANITARY ENGINEER can be improved, as we are out to serve, out to do all we can to make better business men of our readers who in turn will become more valuable Canadian citizens.

Therefore, sanitary and heating engineers who study prices will be kept more conversant in matters of buying, thus enabling them to sell more intelligently and to make a profit on those sales.

MISLEADING STATEMENTS

IF a merchant is found to be making false statements about the goods he sells, he can be prosecuted and either imprisoned or heavily fined and justly so. But irresponsible persons are allowed to make all kinds of assertions upon questions of which their very statements prove they know nothing or almost nothing about. The publisher who allows articles of a technical nature to be discussed in his papers, articles which are not constructive but rather destructive, are the things this publisher sells.

He could not sell his advertising pages to the readers and he would not sell his pages to advertisers of goods which do not bear out the statements, simply because it would not be fair to those who do sell honest goods and give good value.

Then again that publisher would feel that he was a party to a scheme by which readers would not be well served. But it is a different matter if some "know nothing" professes to "know all" about sanitary and heating engineering construction, comes along with a story that has no real value on the very face of it, a story which does its very best to malign the plumber, make false statements about the proper construction of plumbing, piping and fixtures, the article is accepted and the readers are misinformed.

If papers devoted to certain professions, such as farming, would show the farmer how to be a better farmer, show him how to grow two ears of corn where one before grew, how to raise a higher class of cattle, make better butter and encourage more egg production by raising a higher grade of poultry, that farm paper would be doing good, it would become a national or international asset. And, it would enable the farmer to make sufficient money which would enable him to engage a much maligned plumber, though more practical man to install his plumbing, pneumatic water service system and truly sanitary sewage disposal. But instead, many such supposedly good farm papers do nothing but show "How to build your own house at half cost," "How to put in your own plumbing," "How to do this or that, when the facts are that the writers of such articles are only showing our farmers and others who read the articles "How to become botchers," "Jack of all trades and master of none."

A very interesting article is referred to on another page which shows what a writer in *The Country Gentleman* has to say about country plumbing and plumbers.

HOW DID YOU DIE?

Did you tackle that trouble that came your way
With a resolute heart and cheerful?
Or hide your face from the light of day
With craven soul and fearful?
Oh, a trouble's a ton, or a trouble's an ounce,
Or a trouble is what you make it,
And it isn't the fact you're hurt that counts.
But only, how did you take it?

You are beaten to earth? Well, well, what's that?
Come up with a smiling face.
It's nothing against you to fall down flat,
But to lie there—that's disgrace.
The harder you're thrown, why the higher you bounce;
Be proud of your blackened eye!
It isn't the fact that you're licked that counts;
It's how did you fight—and why?

And though you be done to the death, what then?
If you battled the best you could,
If you played your part in the world of men,
Why, the Critic will call it good.
Death comes with a crawl, or comes with a pounce,
And whether he's slow or spry,
It isn't the fact that you're dead that counts,
But only, how did you die?

—*Edmund Vance Cooke.*

Market Conditions and Tendencies

Statements Regarding the Prices and Trend of Supplies.

NEW MARKET SERVICE FOR THE TRADE

CONDITIONS resulting from the war are playing havoc with prices of plumbing and hardware goods. For many months past prices of most lines have been soaring skywards. Some members of the trade have been following the markets, and as all good business men should, have made legitimate advances in the price of the goods they sell whether in the form of labor or materials. The only way to keep fully posted is by following market conditions closely. The man who does not keep in touch with the markets is liable to suffer severe losses as a result of not being thoroughly posted.

This department has been started for the purpose of keeping the readers of SANITARY ENGINEER, plumber and steamfitter, acquainted with the many important price changes which are taking place.

TORONTO, Oct. 14. The cost of plumbers' supplies is still traveling upwards. This week a number of important price changes have gone into effect, the lines chiefly affected being brass valves, wiping solder, bar solder, oakum, lead sheets. Iron pipe remains at the recent advanced price. Trade generally is quiet owing to the curtailment of building operations in the larger cities. There are, however, a number of large jobs, here and there, under way, and on these considerable quantities of supplies will be used. Business in the country districts is good and compares favorably with previous years.

Lead Products Advance In Price

The pig iron market continues very firm. For many months after the outbreak of the war, lead was the one metal that, strange to say, did not advance in price. For a year prior to the outbreak of the war, the average price of [illegible] was $4.16, New York. One year ago the price was only slightly [illegible] the quotation then being $4.50. New York, January, 1916, the market [illegible] at $7.50. The advances from that date to the present, in pig lead, at [illegible] have been as follows:

Jan. 4	Advanced	.25c to 5.75
Jan. 7	"	.25c to 5.75
Jan. 31	"	.20c to 6.10
Feb. 9	"	.15c to 6.25
Feb. 16	"	.05c to 6.30
Mar. [illegible]	"	.10c to 6.40
March 7	"	.20c to 6.60
March 14	"	.40c to 7.00
March 28	"	.50c to 7.50
June 2	Reduced	.50c to 7.00
July 5	"	.50c to 6.50
Aug. 2	"	.50c to 6.00
Aug. 17	Advanced	.25c to 6.25
Aug. 18	"	.25c to 6.50
Sept. 15	"	.25c to 6.75
Sept. 19	"	.25c to 7.00
Oct. 3	"	.. 7.00
Oct. 15	"	.. 7.00

So far this year lead has been 50 per cent. higher than it was during the corresponding period of last year. The price this year has been about 2½c lb. higher than the average for the past thirty years.

The most recent price advance here has been in lead sheets, which are now quoted as follows:—

3 lbs. sq. ft.—$11.75 per 100 lbs.—$12.50, cut to sizes.

3½ lbs. sq. ft.—$11.75 per 100 lbs.—$12.50, cut to sizes.

4—6 lbs. sq. ft.—$11.50 per 100 lbs.—$12.25, cut to sizes.

As will be noted in the foregoing, the charge for cutting has been increased to ¾c lb., instead of ½c lb. as formerly. Lead pipe is now quoted at 13c and lead waste pipe at 14c. Traps and bends are quoted as 10 per cent. off list. Lead fittings are quoted at 70 per cent. off. Wiping solder has advanced ¾c lb., and is now quoted from 23¾ to 26½ lb., according to brand. Bar solder has also advanced ¾c lb. and quotations range from 24¾c for commercial, to 28½c for guaranteed.

Iron Pipe Firm At Recent Advance

Black and galvanized iron pipes remain at the recent advanced prices, with no signs of lower prices for the immediate future.

The new net prices on iron pipe are shown in panel on next page.

There has also been an advance of 2½ per cent. in wrought iron nipples, the new discount for 4-inch and under being 70 per cent., 4½-inch and larger 65 per cent., while 4-inch and under wrought nipples with running thread carry a discount of 50 per cent.

Above are new net prices on black and galvanized iron pipe. The prices quoted are per 100 ft.

Prices Quoted Only On Application

Although prices are now at a high level, there is an upward tendency in enameled wares. The demand is not heavy at present, but increased costs of materials, labor, etc., have to be taken into consideration. On a number of lines, it is understood, the list prices are under revision. Prices on most lines are only quoted on application and are for immediate acceptance. At the time of writing, 5 ft. roll top baths are quoted at $18.90; 5 ft. 6 in. baths at $21.30. Rolled rim sinks, 18 x 30, are quoted at $10, and 20 x 30 in. at $10.60.

New Prices Out On Brass Valves

An advance has gone into effect this week on brass valves. The new discounts are as follows:—Ground keys, stop and waste cocks, 55 per cent.; standard compression cocks, 60 per cent.; high grade, 53 per cent.; cushion work, 48 per cent.; Fuller bibbs, high grade, 52 per cent.; standard, 59 per cent. Basin cocks, No. 2, 54 per cent.; Nos. 1-2, 54 per cent.; bath cocks, 60 per cent.

There is a big demand for radiator and steam valves. Owing to the increased cost of raw materials and labor, prices have advanced from 5 to 15 per cent. Flatway stop and waste cocks are now quoted at 55 per cent. off list; roundway, 55 per cent. for high grade and 58 per cent. for standard.

High grade globe, angle, and check valves are now quoted at 30 per cent. off; standard, at 35 per cent. High grade radiator valves are quoted at 35 per cent.; standard, 45 per cent; patent quick opening valves, 65 per cent.

That the brass industry has been hard hit by the war was intimated by Wm. H. Webster, Chicago, Commissioner for the National Association of Brass Manufacturers' Association, at their recent convention at Atlantic City. Mr. Webster said in part:—

"We have had troubles of our own during the last year. The munitions manufacturers have taken much of our raw material, such as copper, spelter, lead, etc. Copper is now selling at 29 cents, the highest in its history. Its normal price is 12 cents.

"This is a small matter, however, compared with the labor situation. The munition people who indulge in fabulous profits have been extravagant in the wages they pay. They use the same class of labor as we do, but our output doesn't bring the same profit.

"The result is we can't pay the same wages and our employees go over to the munition people. We are compelled to recruit new people, and this means a loss in efficiency. Moreover, as a result of the activities of the munitions manufacturers, the cost of our labor has advanced 32 per cent.

"Supplies, such as crucibles, have advanced 640 per cent., largely as the result of war conditions abroad.

Many Sundry Lines Go Up In Price

There have been many recent advances on goods used more or less by plumbers, or which enter into the manufacture of goods sold to the plumbing trades.

There is a heavy demand for various kinds of oakum, not so much from the plumbing trades as from other sources. Prices have been soaring on oakum as on many other lines. Plumbers' spun oakum is quoted at 8c lb. Other grades are quoted as follows: U. S. navy (English), 15c; new hemp (English), 15c; U. S. navy (American), 18½c; best (American), 19¼c.

There has been an advance in the price of practically all lines of stocks and dies, screw taps, etc.

All kinds of bright, brass and bronze wood screws have again advanced approximately 12½ per cent. Several advances have occurred since the outbreak of the war.

SECOND CANADIAN WAR LOAN OF $100,000,000 OVERSUBSCRIBED BY $80,000,000
AND PLENTY MORE TO ASSIST IN CRUSHING THE PRUSSIAN TYRANT AND MURDERER

—*Racey in Montreal Star.*

Chief War Starter.—Himmel, and that's the country my spy system informed me was ripe for rebellion, ready for insurrection, and only awaited a chance to break from the British Empire.

Linseed oil has jumped 25c per gallon in two weeks, and is now quoted around a dollar per gallon for raw oil in single barrel lots.

Red lead has reached an unprecedented high level, as well as white lead, both in dry form and in oil.

Galvanized sheets have advanced this week 25c per 100 lbs.

Stove bolts have advanced this week and are now quoted to the trade at 60 per cent. off list, instead of 62½ per cent. as formerly.

All kinds of files have also taken a more upward turn this week and lines formerly quoted at 65 and 10 per cent. off list are now quoted at 65 and 10 per cent.

The metal markets generally are all firmer and there is little prospect of lower prices in the immediate future.

Importance of Closely Watching Prices

On many occasions since the outbreak of the war, reference has been made to the necessity of the trade keeping a close watch on the markets and marking up the price of stocks when necessary.

It is only by closely following the markets now that a merchant can depend upon coming out ahead of the war. When prices begin to come down again he will have no choice: His competitors will be buying at the new and lower prices and trade will naturally flow in their direction until such time as he, too, marks down to the low level the goods bought on the crest of the flood.

Now he has a choice, but unfortunately does not always take advantage of it. The men of foresight to-day are marking up their goods when such is warranted by advances in the wholesale price.

Stocks have advanced tremendously in value that must now be realized on to offset the almost certain proportionate depreciation that may come when business becomes re-established on a normal basis.

WILLING AND CONTENTED WORKMEN

Contented workmen, remarks one writer, are prominent factors in producing work of good quality with minimum expenditure. This statement, we believe in the main to be true; the problem is how to get the workmen in a contented frame of mind, and more particularly to keep them so, as the change from a contented to a discontented worker is very easily and quickly made, and, we might remark, the contrary also holds good.

A contented worker should also be a willing worker, for if contentment and willingness exist throughout the organization the result is maximum output with maximum quality, for no willing worker would be content to turn out inferior work, which in a foundry means bad castings, no matter how much he might do in a given time. The same writer further says: Willingness of men makes all the difference between a successful organization and a failure. Men should be treated as partners in a commercial enterprise and not as mere wage earners. It is a great mistake to devise and install complete task systems and other methods for driving men."

STANDARD LAPWELD PIPE S. C.

	2	2½	3	3½	4	4½	5	6	7	8 L.	8	9	10 L.	10
Black	$17.76	$26.33	$34.43	$41.40	$49.05	$59.09	$69.56	$ 90.24	$121.40	$127.50	$146.90	$170.00	$193.20	$210.10
Galvanized	24.24	36.56	47.81	57.50	68.13	83.19	96.94	125.80	165.40	173.80	200.20	230.80	222.40	286.30

STANDARD BUTTWELD PIPE S. C.

	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Black	$3.50	$3.18	$3.18	$4.08	$4.95	$ 7.31	$ 9.89	$11.83	$15.91	$25.16	$32.90	$39.56	$46.87
Galvanized	5.00	5.31	5.31	5.65	7.07	10.46	14.15	16.91	22.76	35.98	47.05	56.58	67.04

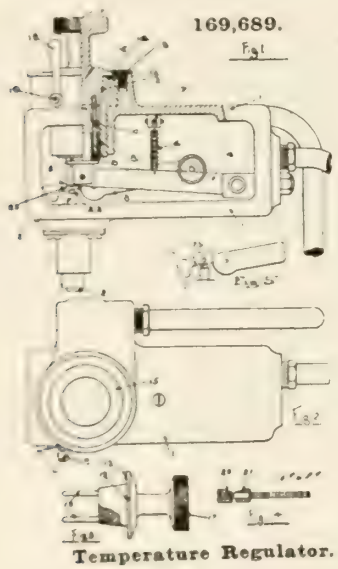
Above are net prices on black and galvanized iron pipe. The prices quoted are per 100 feet.

New Canadian Patents

No. 169,689.

Isaiah Hall, Birmingham, Warwick, England, 23rd May, 1916; 6 years. Filed 31st January, 1916. Receipt No. 260,730.

Claim.—1. In apparatus for regulating and controlling temperatures, the combination of a casing through which gas or liquid is adapted to pass, a valve, a thermostat adapted to operate said valve, a valve seating having a screw thread upon its outer periphery, a seating support wherein the valve seating is screwed, a head upon the exterior of the casing secured against axial movement, and means for transmitting rotary movement from the said head to the said valve seating while permitting to the latter an independent axial movement.



Temperature Regulator.

2. In apparatus for regulating and controlling temperatures, the combination of a casing through which gas or liquid is adapted to pass, a valve, a thermostat adapted to operate said valve, a valve seating, a head upon the exterior of the casing adapted to adjust said valve seating, and means for limiting the rotation of the head to a single revolution and to correspond to a predetermined range of temperature.

3. In apparatus for regulating and controlling temperatures, the combination of a casing through which gas or liquid is adapted to pass, a valve, a thermostat adapted to operate said valve, a valve seating having a screw thread upon its outer periphery, a seating support wherein the valve seating is screwed, a head upon the exterior of the casing secured against axial movement, and means for transmitting rotary movement from the said head to the said valve seating while permitting to the latter an independent axial movement, and the various parts being proportioned relatively to the pitch of the thread upon the valve seating that a single revolution on the head corresponds to a predetermined range of temperature.

4. In apparatus for regulating and controlling temperatures, the combination of a casing through which gas or liquid is adapted to pass, a valve, multiplying mechanism carrying said valve, a thermostat depending from said casing and comprising an outer tube and an outer tube and an inner rod, a steel ball intermediate said inner rod and said multiplying mechanism, a valve seating having a screw thread upon its outer periphery, a seating support wherein the valve seating is screwed, a head upon the exterior of the casing secured against axial movement, and means for transmitting rotary movement from the said head to the said valve seating while permitting to the latter an independent axial movement.

5. In apparatus for regulating and controlling temperatures, the combination of a casing through which gas or liquid is adapted to pass, a valve, a thermostat adapted to operate said valve, a valve seating having a screw thread upon its outer periphery, a seating support wherein the valve seating is screwed, a head upon the exterior of the casing secured against axial movement, means for transmitting rotary movement from the said head to the said valve seating while permitting to the latter an independent axial movement, a stop for normally limiting the rotation of the head to a single revolution corresponding to a definite range of temperature.

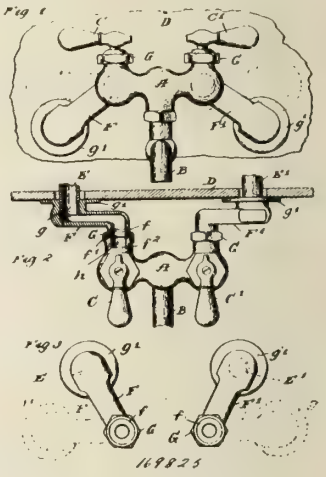
6. In apparatus for regulating and controlling temperatures, the combination of a casing through which gas or liquid is adapted to pass, a valve, a thermostat adapted to operate said valve, a valve seating having a screw thread upon its outer periphery, a seating support wherein the valve seating is screwed, a head upon the exterior of the casing secured against the axial movement, and a plurality of pins slidably engaging holes near the upper periphery of said seating and carried by said head.

No. 169,825.

Albert C. Brown, Chicago, Illinois, U.S.A., 30th May, 1916; 6 years. Filed 1st April 1916. Receipt No. 263,680.

Claim. 1. In a device of the class described, a combination faucet, supply pipes and adjustable links forming a swivel connection between said faucet and the supply pipes, substantially as described.

2. The combination of a faucet having a single discharge and a chamber connecting therewith, two supply ports with valve connections operating therein, supply pipes, and an adjustable swivel connection between each supply pipe and faucet port, substantially as described.



No. 169,825. Faucet.

3. In a faucet, the combination of a casing providing a mixing chamber, a single discharge pipe, valves controlling the openings to the mixing chamber, supply pipes, adjustable pipes forming swivel connections between the supply pipes and the valve controlled openings to the chamber, substantially as described.

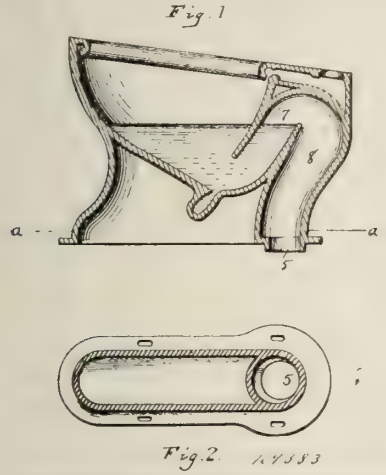
4. A combination faucet having exteriorally threaded pipes extending therefrom, supply pipes, adjustable pipes forming a swivel connection between the supply pipes and the faucet, and means for connecting said adjustable pipes to the faucet, substantially as described.

5. A combination faucet having exteriorly threaded pipes extending therefrom, supply pipes projecting through a vertical wall, adjustable pipes forming a swivel connection between the supply faucet, substantially as described.

No. 169,383.

Charles H. Muckenhirn, Detroit, Michigan, U.S.A., 9th May, 1916; 6 years. Filed 11th March, 1916. Receipt No. 262,739.

Claim.—A closet bowl of the character described, of integral formation, having a rearwardly curved up leg, a down leg enlarged throughout its length, and having a reversed curve, said down leg terminating immediately under the spiller of the bowl and at its terminal having a restricted outlet located at its rear wall, there being an offset located adjacent said outlet at the front wall



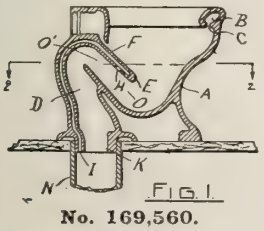
No. 169,383. Water Closet Bowl.

with which the water in its downward progress contacts and is deflected transversely of the leg whereby to ball up the water at the outlet and form a water plug.

No. 169,560.

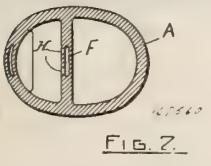
George Middleton, Providence, Rhode Island, U.S.A., 16th May, 1916; 6 years. Filed 8th April, 1916. Receipt No. 263,994.

Claim.—1. A device for preventing overflow of water closet bowls, consisting of a bowl having a trap therein, the



No. 169,560.

Water Closet Bowl.



overhanging wall of the trap being provided with an elongated passageway therein with openings therefrom through said wall.

2. In combination with a bowl having a trap, the overhanging and downwardly inclined wall of which is provided with an elongated passageway extending through the rear wall and having an opening flush with the bottom of the wall, and another opening near the lower inclined end of the trap portion of the bowl.

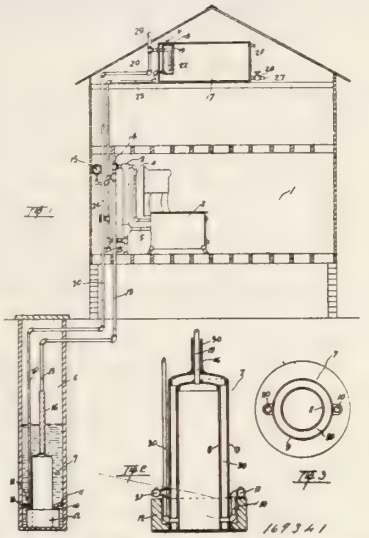
No. 169,341.

George Henry Beckett, Mission City, British Columbia, Canada, 9th May, 1916; 6 years. Filed 25th August, 1915. Receipt No. 255,341.

Claim.—1. Means for raising water, comprising in combination, a steam generator, a cylindrical member adapted to be submerged in a reservoir below the level of said generator, said member comprising a pair of cylinders closed at both ends disposed one within the other and having a dead air space therebetween the inner cylinder having inlet passages near its lower end extending through the dead air space provided with automatically operated inlet valves located exteriorly of the outer cylinder and an outlet passage also extending through the dead air space and exteriorly of the outer cylinder, the outer cylinder having a tubular extension, the upper end of which is closed extending vertically and communicating with the said dead air space, a pipe connecting between the generator and the upper end of the said inner cylinder, said pipe connection being of less diameter than the said tubular extension and passing through the closed end thereof, a main storage tank, a small tank disposed within the main tank, said smaller tank having an opening near its upper end whereby it is in communication with the main tank, a pipe connection between the outlet opening of the inner cylinder and the small tank, and a pipe connection between the small tank and the said generator.

2.—Means for raising water, comprising in combination, a steam generator, a pressure collector adapted to be submerged in a reservoir below the level of said generator, said collector comprising two similar domes located one within the other forming an insulating space therebetween, the inner dome having inlet passages near its lower end provided with automatically operated inlet valves located exteriorly of the outer dome, and an outlet passage also extending exteriorly of the outer dome, a pipe connection between the generator and the upper end of the inner dome, a main storage tank, a small tank disposed within the main tank and in communication therewith, a pipe connection from the outlet opening of the inner dome opening into the small tank and also to the atmosphere, and a pipe connection between the small tank and the generator.

3.—A device of the class described, comprising a double walled cylinder designed to be submerged in water, the space between the walls being open to the atmosphere, the inner cylinder being provided with a water inlet, a non-return valve in the inlet, a steam generator, a water reservoir disposed at a level higher than that of the generator, a discharge pipe from the said inner

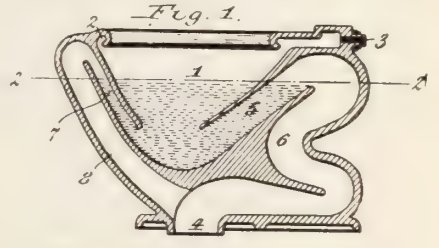


169,341. Water Raising Device.

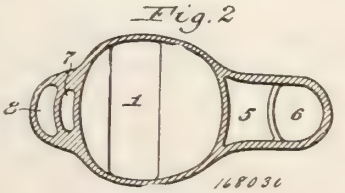
cyliner opening to the said reservoir and also the atmosphere, a supply pipe from said reservoir to the generator, a steam pressure supply pipe from the generator to the submerged tank, and means whereby the said pipes drain automatically to stand empty when the device is inactive.

John Joseph Boyne, Buffalo, New York, U.S.A., 7th March, 1916; 6 years. Filed 10th January, 1916. Receipt No. 259,730.

Claim.—1. A water closet comprising a bowl, an outlet below the bowl, a



No. 168,030. Water Closet.



siphon having an ascending passage extending upwardly from the bowl and a

(Continued on page 30.)

GOSSIP OF THE TRADE

THIRTY-three years is a long time to be in harness in the sanitary and heating business, but such is the experience of Messrs. Pennington and Brian, sanitary and heating engineers, of Windsor, Ont. Individually and collectively they represent the best type of men engaged actively in the trade to-day. They do a large and profitable business and are both expert mechanics. They have often been called into consultation on work other than their own, in which case they insist on being paid for their time and experience while acting in an advisory way. The business was established in 1883, and the outstanding feature of it is that no business is accepted that does not carry with it a reasonable profit. Each partner has a son prominent in the construction work of Windsor. Mr. Pennington's son, J. C. Pennington, is an architect, and has a large practice. This year he is building the new High School, also a large school in Ford City. Mr. Brian's son, Albert, is the city engineer for Windsor.

Speaking to Mr. Brian some few months ago in connection with the way they run their business, he replied, "We certainly do run our business," and that is the reason we are making a success of it. The reason why so many sanitary and heating engineers fail to succeed is that "their business runs them." They should first learn to control their actions, their work, and anything they undertake to do, but should never allow the undertaking to undertake you."

Mr. Brian is not likely to forget that interview. It took place just after one of the most severe snow storms in the history of Windsor.

ELECTED VICE-PRESIDENT AND GENERAL MANAGER

Mr. P. D. Ivery having disposed of his interest in the International Malleable Iron Co., Guelph, has resigned his position as vice-president and manager. Mr. W. H. Burgess formerly the general superintendent has been elected to fill the above named position.

H. R. SIME GOES EAST.

H. R. Sime, of Swift Current, Sask., is moving to Port Arthur for the winter at least, and will manage the retail department of his brother's plumbing business, the latter's manager having enlisted.

OBITUARY

Lieut. Wylie Sharp, formerly a member of the firm of Francis Hankin & Co., Metallic Builders' Supplies, of Montreal, has died as the result of wounds. He was a native of Dundee, Scotland, and came to Canada in 1906.

CENTRAL STATION HEATER

Central Station Management, by H. C. Cushing, jun., and Newton Harrison; 397 pages, 7½ in. x 4¾ in. Published by the D. Van Nostrand Co., New York. Price $2 net. This is a new book dealing with the principles of central station management as adopted by many successful electric light and power stations in the United States. The various phases of the subject are discussed in a comprehensive and practical manner, emphasis being laid on the necessity of close attention to details, necessary for successful operation. Both the commercial and technical features of central station management are dealt with, considerable space being devoted to the question of rates and cost of power. Other subjects discussed include street and interior lighting, while one chapter is devoted to district heating from central stations, in which it is shown how this can be done with profit. The book contains thirty-two chapters, of which twenty-five are devoted to management and distribution, while the remaining chapters deal in a general way with the power plant end of the subject. The book is not too technical, but contains much valuable information, covering a subject full of important details, a careful consideration of each being essential to obtain satisfactory results. Another service the book performs is to show how central stations can be managed efficiently, and at the same time with proper consideration of the public which it serves thus establishing cordial with proper relations between the pro-

W. J. BRIAN, *J. C. PENNINGTON*

The progressive sanitary and heating engineers in Windsor, Ont.

ducer and consumer; a desirable condition for a public service company to operate under. The book is printed in clear type, and is bound in substantial cloth covers.

REFERENCE HEATING BOOK

The McAlear Mfg. Co., Chicago, Ill., have issued a reference book on the McAlear system of vacuum and vapor heating, which deals with the subject in a comprehensive manner. In addition to a full description of the system, the book contains complete particulars of the various parts, their construction, method of operation and directions for installing. The illustrations include details of the traps and pumps, and also several diagrams showing various systems and applications. Copies of this book may be obtained from Arthur L. Leitch, Kent Building, Toronto.

A DISCUSSION ON CREDITS AND DISCOUNTS

(Continued from page 13)

quent turnover amounts to something like $120 in the course of the year. Naturally, then, he cannot expect the same percentage of profit upon an article of this kind as upon an article which he has to keep in stock two or three months before disposing of it.

More Frequent Turnover

So it is with the sanitary engineer. Restrict your credits, pay your own accounts promptly, and you will then be able to turn your money over more frequently, with a corresponding decrease in your percentage of overhead expenses, to the consequent satisfaction of your customers, who will also benefit by your reduced expenses. The French have a proverb: "Qui paie ses dettes s'enriche"—"He who pays his debts enriches himself," and it is in no case more true than in that at present under discussion, and the sanitary engineer, more especially the beginner, may rest assured that he himself stands to benefit most by the passing of the happy-go-lucky system of payment, and by a strict enforcement of a well-considered system of credits and discounts as between himself and the jobber or manufacturer.

PRACTICAL SHEET METAL WORK

(Continued from page 16.)

A decagon is a plane figure consisting of ten sides and ten angles.

And a dodecagon is a polygon with twelve sides.

A Tangent

A tangent is a straight line which while touching the circumference of a circle, does not cut the circle, the point at which a tangent touches the circle is termed the point of tangency or contact.

A Chord

A chord is a straight line which joins the extreme points of an arc, or rather a straight line drawn across a circle which does not touch the centre of the circle and does not intersect it.

A Secant

A secant is a straight line very similar to that of a chord except that it cuts or intersects the circle at two points.

Plate 2 shows figures described in this article, which, if the student will draw by the use of simply a rule and pair of compasses, will be found of great benefit.

The next article will show how the various figures may be developed.

(Continued in next issue.)

The First of Semi-Luxuries

The Conservation Commission carried out a survey of 400 farm homes in 1915. Of these 400 thirty-eight per cent. possessed pianos, thirty-two per cent. had organs, five per cent. autos, and only two and a half per cent. an inside water service with sanitary conveniences.

Music in the home is a good thing, possession of a motor adds much to the pleasure of life in the country, but an inside water service and the things that go therewith means more in labor-saving and really good living than any one of the other semi-luxuries and semi-necessaries named.

The first thing to provide for, after the absolute essentials are in possession, is a modern water service, and this can be installed, in the average farm home, for less than the cost of a good piano.—Toronto Globe, Oct. 11, 1916.

Commenting upon the above, we wish to congratulate *The Globe* upon ever having the courage to say as much as they have done, and particularly so, for having the above place in a prominent position and in black face type.

Now, it is up to sanitary engineers to show that pianos and organs are only semi-luxuries, that water is absolutely essential and that plumbing fixtures too are necessities. In this way such pithy remarks made by *The Globe* can be made of inestimable value both to farmer and sanitary engineer.—Editor.

KINDLY MENTION THIS PAPER WHEN WRITING ADVERTISERS

RURAL SANITATION

(Continued from page 18.)

lative elevation of the contour in feet, the elevation of some particular point in the survey being either previously determined or else assumed at, say, 100 feet.

When the ground is only slightly sloping, an arrangement similar to that shown in Fig. 49 has been recommended. Each run of disposal tile can be made with as small a grade as desired, for the runs are laid parallel with the contour lines, or, in other words, at right angles with the slope of the field. The main carriers cross the contours at about an angle of 45 degs. This has the effect of considerably reducing the grade in the mains, as can be seen by studying the figure. Here the contours show a difference in elevation of one foot, and are approximately ten feet apart. If the mains crossed the contours at right angles, that is, followed the slope of the field, the fall would be one foot in ten feet. By, however, crossing the contours the fall is only 1 foot in about 15 feet. Another advantage is that, the lateral tiling may be fitted directly to the Y-branches of the mains when such an arrangement is followed.

It may prove an advantage in such systems to use only one part of the disposal bed or field at a time. Frequently in large systems on level ground or where the soil is heavy it is also desired to use only one part of the field at a time while the other is resting. In these cases provision can be made for diverting the sewage from the main leading from the flush tank by valves, switches, plugs, or some other simple means like that suggested in Fig. 49, where the stop planks can be raised or lowered by hand as desired, or in Fig. 50, where the cast iron gate closes off either one of the main carriers. The great objection to all such means for diverting sewage is that while it is a desirable improvement if the diverting apparatus is attended to, the latter is not automatic, and trouble may be caused if the operator is forgetful. For example, one part of a sewage disposal field may be kept continually dosed when it was originally designed to have a rest, say, every week. Meanwhile the other part of the field, due to the negligence of the operator, is lying idle.

Suggested arrangements for mains and tile when the ground is steeply sloping will be taken up in the next article.

(Continued in next issue.)

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

Is Water Compresible?

Editor THE SANITARY ENGINEER.

I have always been under the impression that water is not compressible, but cannot quite reconcile myself to the fact, particularly so when water can be expanded. If a kettle full to the brim with cold water, say 38 degrees Faht., is placed on a fire, it will overflow almost as soon as it begins to change in temperature. Suppose this hot water were poured into a vessel or cylinder and pressure put on it, would it not be possible to compress the hot water to its original bulk, that of the bulk it was at ?—C. H. W.

This very question came to the mind of the writer some years ago, viz., that if water is incompressible, why should it be possible to expand water.

The real fact is that water is not incompressible, neither is it possible to expand water.

This statement may seem rather strange, but still the fact remains.

Here is the solution. To change the bulk of water, some action other than force must take place, for instance, water is said to expand when subjected to extreme heat or cold. But what is heat or cold? Both are of a physical nature, and have certain powers. Extreme cold will expand solid metals just as heat or a change of degree, say from 38 deg. to 50 deg. will expand water or metals.

Regarding heat expanding water, the fact that heat units are absorbed by water at a lower temperature, which in turn appears to cause the water to expand, simply means that there is the same amount of water plus so many atomic heat units, this resulting in additional bulk. Let us get away for a moment from the fact that it is water we heat. Suppose we apply a certain amount of heat to a vessel containing air only, the vessel is absolutely air tight and at 38 degs, what will happen? The air will expand? No, not necessarily, the extra presure is really an additional number of heat units added to the confined air.

The same effect could be procured by compression, but the bulk of air would be less.

So that when we speak of water expanding, it would be well to remember that such is really not the case, but that there is some other element present which causes the apparent bulk of water to increase in size.

EDITOR.

WHERE DID WATER GO?

Editor THE SANITARY ENGINEER:

I installed a hot water system this Fall and put the heat on. All appeared to be working fine, but about a week after I found the water in the expansion tank had lowered about two inches. The owner thinks there must be a leak somewhere and I can't find it anywhere. Could you give me some answer to the question, where did the water go?—Hot Water System.

This is a very usual state of affairs, though not always observed. For instance, a hot water system is filled up with water, and all the air is apparently let out of the system, then heat is applied. Now, water contains approximately 2 per cent. of air, and when heated, this air flies off, and by opening the air valves this is proved.

No doubt the owner let off the air, which has separated from the water, resulting in the water appearing lower in the gauge glass on the expansion tank. Of course, this would be when the water is cool, but when hot the level of the water will be raised on account of expansion.—Editor.

Book on Operating High and Low Pressure Boilers

Editor THE SANITARY ENGINEER:

Please inform me where I can procure a book on how to operate high and low pressure steam boilers and heating plants, and the name of publishers of same.—G. D. B.

Your inquiry to hand. We do not recollect ever hearing of a book of instructions on "operating and running high or low pressure boilers."

But there is a very interesting book published by Scott, Greenwood & Sons, 8 Broadway, Ludgate Hill, London, E.C. England, and which can be procured through out Book Department here.

This book is entitled "Steam Boilers and Combustion," and the reason that no such instruction book is published is on account of there being so many different types of boilers, all of which carry with them different operating instructions. This, you will readily realize when you read the book in question, if you decide to procure one.—Editor.

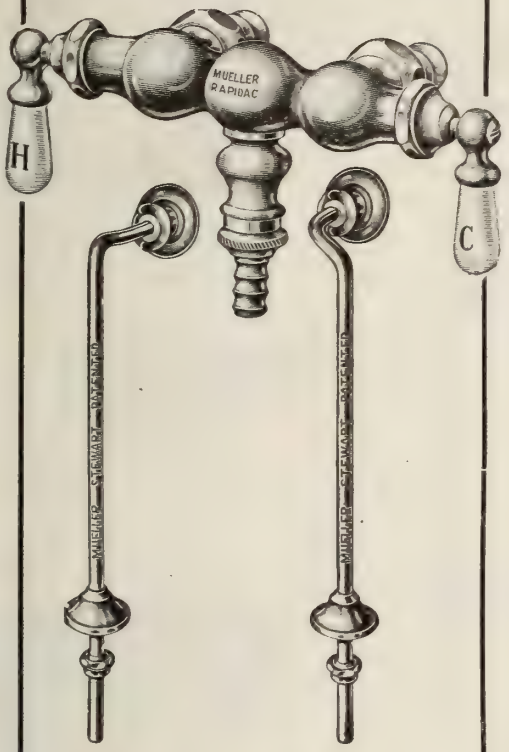
HEAT ABSORBER

Editor THE SANITARY ENGINEER:

Could you inform me through the Question Box what material or liquids will absorb the greatest number of heat units, and what relationship, or difference is there between a B. T. W., so-called, and a degree of heat?—S. F. Subscriber.

Water is, with the exception of bromine and hydrogen, the greatest absorber of heat, and all data on heat units are based upon the amount of heat units which can be conveyed from any given fuel or heating medium to water. As a metal, it is believed that aluminum will conduct heat quicker than any other known metal, and this can very easily be proved by placing a bar of this metal

(Continued on page 30.)



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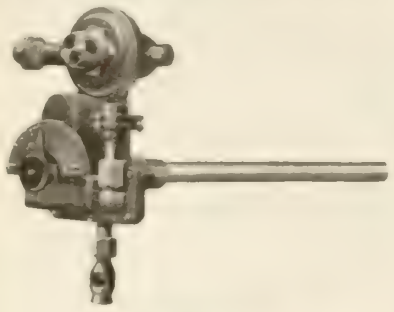
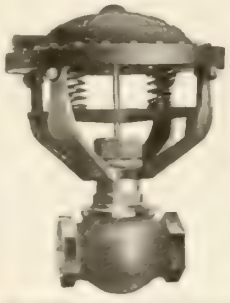


REGULATOR



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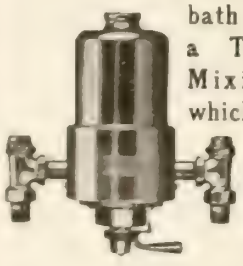

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Positively Anti-Scalding.

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into a fire alongside of a piece of iron, copper, or brass. Then by touching the end farthest out of the fire the aluminum will be found to be hot the soonest. Furthermore, the aluminum will retain its heat longer than the other metals mentioned. This is proved by the fact that many electric fireless cookers now use aluminum as the heating element instead of metal or soapstone.

Heat Units and Degrees

A heat unit, or B. T. W., has no relationship to a degree of heat, simply because one degree may mean, on the one hand, one unit, or it may mean any number of units, according to the bulk of water, or other matter heated.. A heat unit may be defined as the amount of heat required to raise one pound of water at say 65 degrees to 66 degrees.

As an example, suppose 25 lbs. of water at 65 degrees Faht., is required to be raised to 75 degrees, viz., 10 degrees higher, simply multiply the number of gallons by the extra degrees required and the answer is 250, which would mean that 250 B. T. W.'s are required. —Editor.

NEW CANADIAN PATENTS

(Continued from page 25.)

descending passage extending downwardly from the upper end of said ascending passage to said outlet, and an overflow having an ascending passage extending upwardly from the bottom of said bowl, and a descending passage extending downwardly from the upper end of said last-mentioned ascending passage to said outlet, the upper ends of the passages of the overflow being arranged higher than the upper ends of the passages of said siphon, and the capacity of the descending passage of the overflow being greater than the companion ascending passage.

2. A water closet comprising a bowl, an outlet below the bowl, a siphon having an ascending passage extending upwardly from the bowl, and a descending passage extending downwardly from the upper end of said ascending passage to said outlet, and an overflow having an ascending passage extending upwardly from the bottom of said bowl and a descending passage extending downwardly from the upper end of said last-mentioned ascending passage to said outlet, the upper ends of the passages of the overflow being arranged higher than the upper ends of the passages of said siphon, and the capacity of the descending passage of the overflow being greater than the companion ascending passage and the lower ends of the ascending passages of the siphon and overflow being on the same level.

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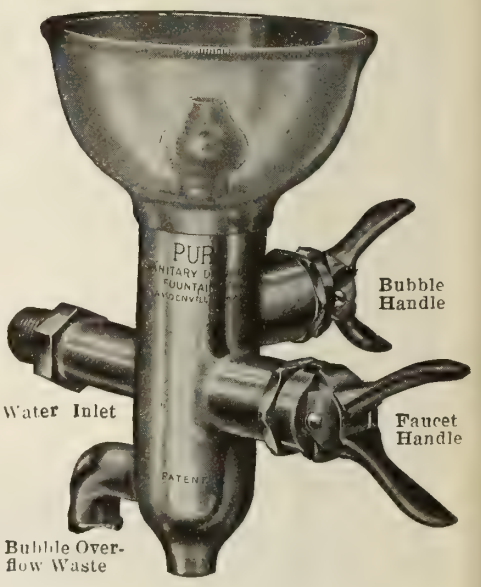
1. Puro Sanitary Drinking Fountains will give you a *better* water supply *cheaper*.
2. Puro will cut your water bills 15% to 35%.
3. PURO will safeguard the health of your employes and raise the standard of efficiency.

Are not these reasons enough? Then why hesitate longer?
PURO equipment is not expensive—the first cost is *low* and the up-keep *nothing*. Easily attached; positively fool-proof. Let us make you a special proposition for a try-out in one of your departments. Write us now—to-day—giving us the number of men; an inquiry will cost you nothing.

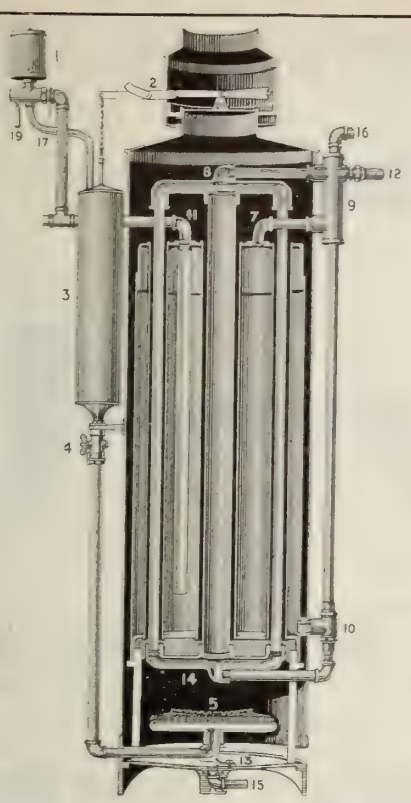
"PURO-FY"

YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company
143 University Ave.
TORONTO, CANADA



Stopping an advertisement to save money is like stopping a clock to save time. Advertising is an insurance policy against forgetfulness—it compels people to think of you.



The Allman Automatic Gas Water Heater

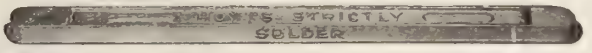
Efficient, Economical and Durable
The Only Superheater on the Market

Will light from any floor.
Measures the gas each operation.
Will supply water at any temperature up to 212° Fah.
20 gallon bath in 8 minutes for 12 feet of gas.
No possible waste of gas.

The Allman Automatic Gas Water Heater is entirely new in every respect, but has been put to the most severe tests before being put on the market. It has many claims of superiority besides those mentioned above—speed, small gas consumption, heat from pilot utilized, self-extinguishing, danger of gas poisoning eliminated, etc. Write for circular and learn about this, the last word in Gas Water Heating.

The James Morrison Brass Mfg. Co., Limited
93-97 Adelaide Street West, TORONTO

Our Mixed Metal Sales Amount to Over $5,000,000 Annually



HOYT'S WIPING SOLDER is as perfect as experience and first class ingredients can make it. As only one perfect Wiping Solder can be made we manufacture only one grade, which must necessarily be Hoyt's high standard of quality.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends. Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO
New York, N. Y.; London, Eng.; St. Louis, Mo.

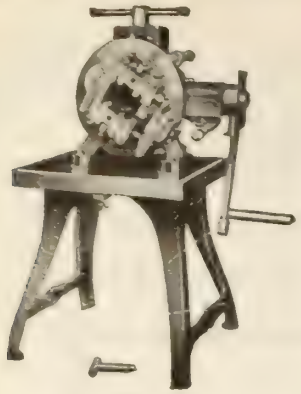
OUR POSITIVE CIRCULATOR

Will Solve Your Hot Water Circulation Troubles

By using our Positive Circulators you can save money on the cost of your hot water jobs and get much better control of them when in operation. Simple to install and easy to operate, they will increase the circulation in the system whether the water is hot or cold, and at the same time they are absolutely safe, as no closed system is necessary. A good line for you to install also on unsatisfactory jobs, greenhouses, garages, etc.

WRITE US FOR FURTHER INFORMATION.

Robert Angus, HEATING SPECIALIST **514 William Street, London, Ont.**



No. 00

PIPE MACHINES

Either Hand or Power

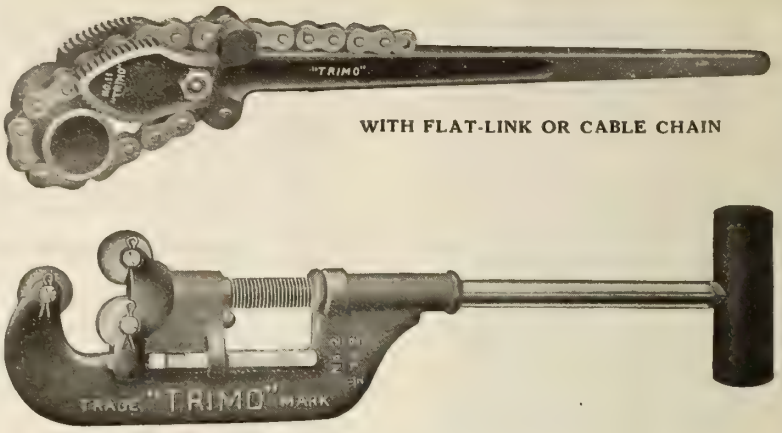
This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
A time and labor saving machine.

Manufactured by

THE ARMSTRONG MFG. CO.
317 Knowlton Street
BRIDGEPORT, CONN.
WRITE FOR CATALOGUE

World-Famed Specimens of the Age of Steel

TRIMO



WITH FLAT-LINK OR CABLE CHAIN

TOOLS

Send for Catalog No. 91

MADE BY

TRIMONT MFG. CO., 55 Amory Street, Roxbury, Mass., U.S.A.

Consulting Sanitary Engineer

Advice and Plans on Water Supply and Sewage Disposal for Residences, Factories, etc.

H. L. SEYMOUR, B.A.Sc., A.M. Can. Soc. C.E. Box 95 Sanitary Engineer TORONTO - ONTARIO

Please Remember:

That the most satisfactory way to remedy a poor

HOT-WATER JOB

is to instal a

Clark Temperature Booster

This will increase the circulation and thus make the job efficient.

Your customer will be well pleased, and your reputation as a fitter will be greatly enhanced as a result.

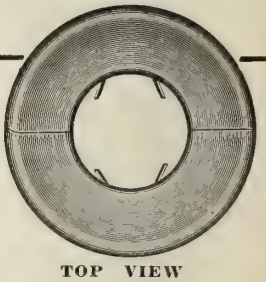
TRY ONE OUT AND SEE

Made only by

W. E. CLARK, Limited

719 King Street West - - Toronto

OPEN VIEW NO. 10-A.



TOP VIEW NO. 10-A.

The CEILING PLATE that's better

THE NO. 10—A NARROW FLANGE PLATE IS A STEEL HINGED PLATE. FLANGES ¾" WIDE. HIGHLY FINISHED, ESPECIALLY DESIGNED FOR TWIN CONNECTION "NARROW."

The split ceiling plate is coming more and more into use than ever and ALWAYS GIVES A NICE FINISH, because it can be attached to mains and risers at the very last, and is not exposed during completion of a building on the floors.

High quality at the right price.

Gem No. 4.

Gem No. 4 Automatic Air Valve

Made from the best brass obtainable. Pressed shell and pressed brass base which eliminate danger from blowholes, which is a fault with cast bases.

Write for catalog showing our complete line of specialties.

The BEATON & CADWELL MANUFACTURING Co.

New Britain, Conn.

Eastern Agent: J. R. Devereux & Co., 233 St. James Street, Montreal. Western Agent: A. E. Hinds & Co., Chamber of Commerce, Winnipeg.

Is the Money Always There?

WHEN you have wanted a certain thing that would have added to the pleasures of life, was the money always there? when you figured up to see if "Cash on hand" would warrant you to make the purchase. Have you ever felt the need of a good vacation or wanted some little extra luxury, but simply could not afford it because your regular income was not sufficient?

WE have a plan that will enable you to add these extra luxuries without interference in any way with your regular occupation; a plan from which you may derive sufficient income to warrant your having all the added pleasures of life. This plan may be worked during spare time without interference with your regular duties. One hour in the evening spent among your acquaintances—a half-hour after lunch in the office or factory will give you an additional $5.00 or $10.00 weekly.

WE have hundreds of subscriptions in your locality ready to be taken. A representative on the spot could secure these orders, saving these people the trouble incidental to mailing. These orders, together with the many other subscriptions which may be added from the friends of our old subscribers whom they will recommend to you, will give you an income that with the same amount of work will double your earnings each year. The work is both pleasant and profitable. No previous experience required.

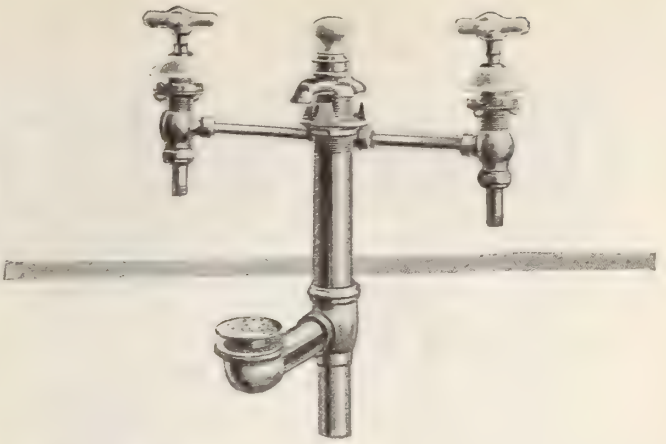
This plan will interest you, so write us to-day for full particulars.

The MacLean Publishing Co.
LIMITED

Division B.

143-153 University Avenue

TORONTO **ONTARIO**



Your Stock Lavatories Will Take This Fixture

This means that you can give a customer an up-to-date combination fixture which discharges tempered water from a single nozzle and permits using running water at any desired temperature; it means that you can furnish the accepted standard in sanitation and the most modern idea of plumbing perfection without tying up your capital in expensive lavatory and special fixtures.

The Speakman UNIT will fit any standard lavatory which is drilled for ordinary waste and two cocks, and when fitted to a stock lavatory, a fixture equalling the best combinations is the result.

These fixtures are patented in the United States and Canada but contrary to usual custom we have kept the prices on this fixture low by reason of the large quantity that we make. It really costs no more than two high-grade faucets and a separate waste.

A complete stock of these fixtures is carried at all times in Toronto from where orders will be shipped, hence they are duty free to you. Ask your jobber or write us direct for prices and further information.

WILMINGTON SUPERIOR SPEAKMAN QUALITY DELAWARE

SPEAKMAN SUPPLY AND PIPE CO.
RIVERVIEW WORKS
WILMINGTON, DELAWARE
U.S.A.

SPEAKMAN

Classified Buyers Guide

Occasionally advertisements are inserted in the paper after this page has gone to press. The insertion of the Advertiser's name on this page is not part of the advertising order, but is inserted solely for the convenience of the reader of the paper

Air Line Systems.
C. A. Dunham Co., Ltd., Toronto.

Air Valves.
Canadian Wolverine Co., Ltd., Chatham.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Jenkins Bros., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.

Asbestos Goods.
James Morrison Brass Mfg. Co., Toronto.

Boilers, Steam or Hot Water.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Boiler Feed Regulators.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Brass Goods, Valves, etc.
Canadian Wolverine Co., Ltd., Chatham.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Galt Brass Co., Limited.
Jenkins Bros., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Ltd., Walkerville.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.
Speakman Supply & Pipe Co., Wilmington, Del.

Brass Pipe and Tube.
B. & T. Manufacturing Co., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Speakman Supply & Pipe Co., Wilmington, Del.

Bubblers.

Cellar Drainers.
James Morrison Brass Mfg. Co., Toronto.

Chain Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Closets.
Standard Sanitary Mfg. Co., Toronto.

Country Residence Equipments.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Damper Regulators.

Drainage Fittings.

Drinking Fountains.

Ejectors, Steam.

Ejectors for Sewage.

Evaporators.

Fittings.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.
Port Hope Sanitary Mfg. Co., Ltd., Port Hope.

Electric Pumping Machinery.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Empire Mfg. Co., Ltd., London, Ont.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Faucets.
Canada Metal Co., Ltd., Toronto.
Empire Mfg. Co., Ltd., London, Ont.
Port Hope Sanitary Drinking Fountain Co., Toronto.

Fittings.
Canada Metal Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Flushometers.
Canada Metal Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Empire Mfg. Co., Ltd., London, Ont.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.
Speakman Supply & Pipe Co., Wilmington, Del.

Floor and Ceiling Plates.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.
Canada Metal Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Galt Brass Co., Limited.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
James Morrison Brass Mfg. Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Gasoline Engines.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Gas Water Heaters.
Galt Brass Co., Limited.
Holstream Heater Co., Cleveland.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Oster Mfg. Co., Cleveland.

Generators.
W. E. Clark & Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.

Heaters.
Darling Bros., Ltd., Montreal.
Lord & Burnham Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Lead.
Canada Metal Co., Ltd., Toronto.
Galt Brass Co., Limited.
Hoyt Metal Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Mixing Valves.
Canada Metal Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Port Hope Sanitary Mfg. Co., Ltd., Port Hope.
Speakman Supply & Pipe Co., Wilmington, Del.

Monkey Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Oil Storage Systems.
National Equipment Co., Ltd., Toronto.

Packing.
Canadian Wolverine Co., Ltd., Chatham.

Packless Radiator Valves
W. E. Clark & Co., Toronto.
Kerr Engine Works, Walkerville.

Pipe and Radiator Hangers.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.

Pipe, Black and Galvanized.
Canadian Tube & Iron Co., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Pipe Cutters.
Trimont Mfg. Co., Roxbury, Mass.

Pipe Joint Compounds.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

Pipe, Soil, and Fittings.
Anthes Foundry Co., Toronto and Winnipeg.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Warden King, Ltd., Montreal.

Pipe Threading Tools and Machinery.
Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.
A. B. Jardine & Co., Hespeler.
Oster Mfg. Co., Cleveland.

Pipe Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Porcelain Ware.
Canada Metal Co., Ltd., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Pumps.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
Galt Brass Co., Limited.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.
Robert Angus, London, Ont.

Radiators.
Lord & Burnham Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., New Britain, Conn., U.S.A.

Radiator Traps (Steam).
W. E. Clark & Co., Ltd., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Reducing Pressure Valves.
Canada Metal Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Septic Tank Valves and Syphons.
Anthes Foundry Co., Ltd., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
West Toronto Foundry Co., West Toronto.
Anthes Foundry, Ltd.

Solder.
Canada Metal Co., Ltd., Toronto.
Hoyt Metal Co., Toronto.

Steam Specialties.
W. E. Clark & Co., Ltd., Toronto.
Darling Bros., Ltd., Montreal.
Dart Union Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville, Ont.

Steam Traps.
Canadian Morehead Co., Ltd., Woodstock.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Smoke Test Machines.
James Morrison Brass Mfg. Co., Toronto.

Tanks, Steel and Wood
Ontario Wind Engine & Pump Co., Toronto.
National Eqt. Co., Ltd., Toronto.

Temperature Boosters
W. E. Clark & Co., Toronto.

Testing Plugs.
James Morrison Brass Mfg. Co., Toronto.

Tools.
Armstrong Mfg. Co., Bridgeport, Conn.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Nicholson File Co., Port Hope, Ont.
Williams, J. H., & Co., Brooklyn, N.Y.
Oster Mfg. Co., Cleveland.

Unions.
Canada Metal Co., Ltd., Toronto.
Dart Union Co., Ltd., Toronto.

Vapor Heating Systems.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
W. E. Clark & Co., Ltd., Toronto.

Vitro Tanks
Cluff Mfg. Co., Toronto.

Vacuum Systems of Heating.
W. E. Clark & Co., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Water Supply Systems.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto
Empire Mfg. Co. Ltd., London, Ont.

The Service That Pays

"King" Boiler Service

WHEN you sell and install a "King" Boiler, you have secured a lasting customer, because the "King" Boiler is built for service—"Long Service."

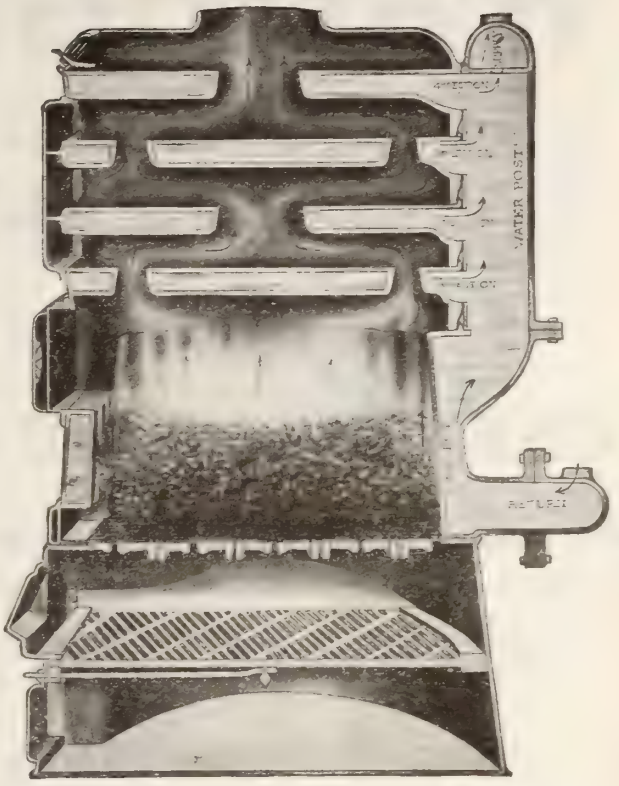
IT is not the boilers which have the largest heating surface that give highest efficiency. But rather the construction of the boiler which assists the water to absorb the most heat units, thus ensuring maximum of service at minimum fuel cost.

STEEL and RADIATION, Limited

Head Office: FRASER AVENUE, TORONTO

304 University Street, MONTREAL **101 St. John Street, QUEBEC**

AGENCIES IN ALL LEADING CITIES



Sectional View "KING" Boiler

ALPHABETICAL LIST OF ADVERTISERS

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Vici Radiator Co. 8

United Electric Co. 7

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Wynne-Roberts, R. O. 32
Wallaceburg Brass & Iron Mfg. Co. 8

WROUGHT PIPE

BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED
Montreal Works: Lachine, Can.

STEAM AND HOT WATER HEATING

BY H. C LINCOLN

This book is one of the most simply written books published. It is just the book which the heating engineer needs who has received a limited education.

Postage Paid $1.25

TECHNICAL BOOK DEPT.
MACLEAN PUBLISHING COMPANY, LIMITED
143-153 UNIVERSITY AVE., TORONTO

You Sell Something to Somebody

A[illegible] to you somebody you must make known—by advertising—what you sell, why it is good, and so on. Also, you must have a medium—a publication read by your customers or should-be customers.

All this you consent to without demur. What may perplex you a little is the Medium to employ.

This should not be a puzzle if your product or commodity is one purchased by the general public, and if your constituency of buyers is found everywhere in Canada.

The one medium of quality and of national circulation is

MACLEAN'S MAGAZINE

You can find no substitute for it at a lower cost, and none that will carry your proposals or announcement with greater acceptability.

The conclusion is plain.

N.B. Objectionable advertising not accepted. Both editorial and advertising columns are closely censored to keep them clean and decent.

Published by
The MacLean Publishing Co., Limited, 143-153 University Ave., Toronto

Want Ads.

There is someone who is looking for just such a proposition as you have to offer. For two cents a word you can speak across the continent with a condensed advertisement in this paper.

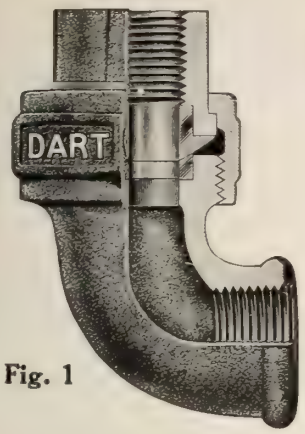


Fig. 1

By the use of Figure 1 you save two threads, do neater work and make sure that the connection is trouble-proof.

DART

Union Elbows—Female, and Male and Female

Save Time and Labor

2-BRONZE SEATS-2

NO CORROSION

Heavy Malleable Iron Pipe ends and nuts ensure strength and durability. **Dart Unions stay tight**—they never require readjustment.

Nearly twenty years of successful record is your guarantee of the Dart construction.

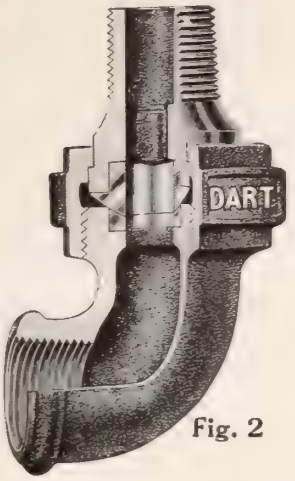


Fig. 2

Figure 2 is a 4-in-1 fitting. It cuts out nipple and one thread at running end and nipple, elbow and two threads at the elbow end.

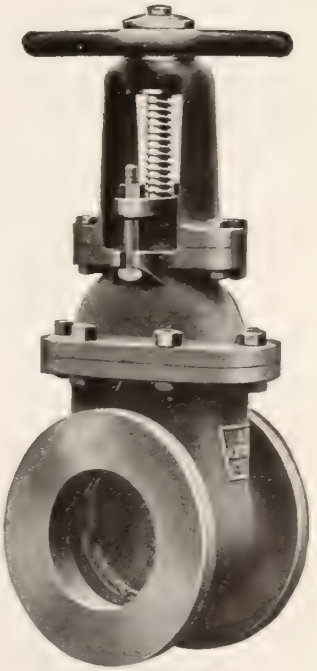
SOLD BY ALL JOBBERS.

Manufactured by DART UNION COMPANY, LTD., Toronto, Canada

There Are Lots of Gate Valves

advertised and sold, but not all of them possess that neat appearance, combined with strength and stability, which characterizes

KERR IRON BODY GATE VALVES



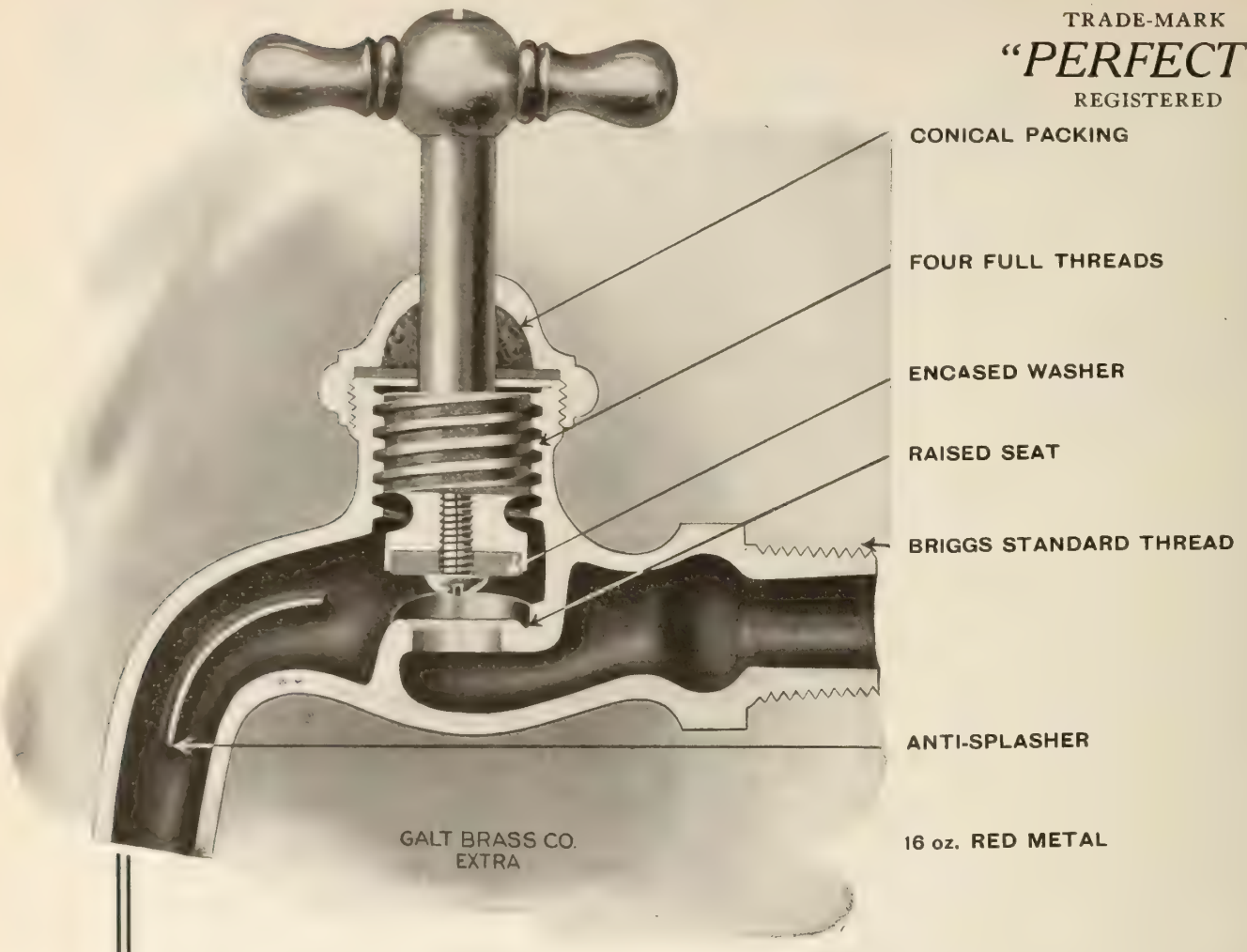
Specify KERR'S (KEYSTONE) Iron Body Gate Valves on your next order, and let us prove what we claim for them.

Our Catalogue No. 5 tells all about them. It is yours for the asking. Write us to-day.

Approved by the Fire Underwriters Association, and Registered by Boiler Inspection Departments of Ontario, Saskatchewan and Alberta.

THE KERR ENGINE COMPANY, LIMITED - Walkerville, Ontario

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. X | Publication Office: TORONTO, NOVEMBER 1, 1916 | No. 21

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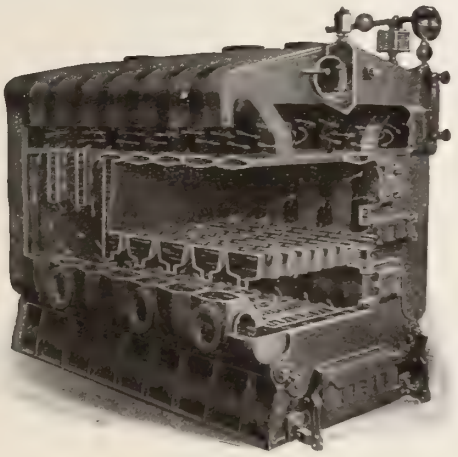


PLATE A2413—Smokeless Down Draft Boiler

Empire Boilers and Radiators

We carry in stock a complete line of Boilers, Radiators, Tank Heaters and Heating Specialties.

These products have been manufactured under the world's most highly developed scientific methods of test and manufacture, ensuring standardization, uniform working results and great durability.

PLATE A2450—Norwall Syphon

When only the finest quality in Plumbing or Heating material is required, specify "Empire."

Write Us for Prices.

Catalogue A sent on request.

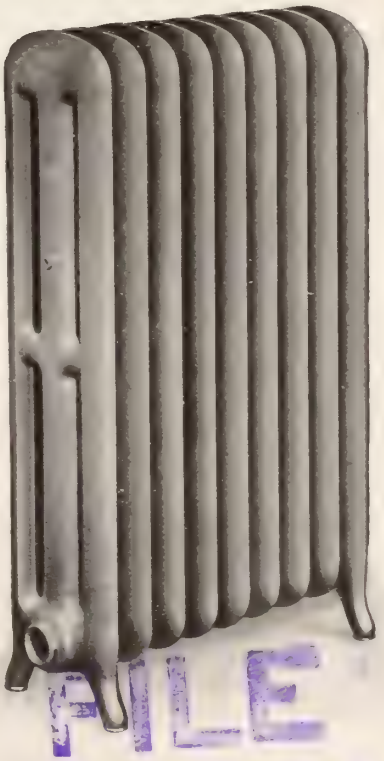


PLATE A2430—Plain Three Column

Empire Mfg. Co., Limited

LONDON TORONTO

FILE COPY

The Goods You'll Eventually Buy

Based upon a quality, second to none; you make no mistake in starting now to supply your customers with BEAVER BRAND White Enamel Ware

Ask your jobber for BEAVER BRAND CAST IRON ENAMEL WARE
and build up your reputation

EVERY DOLLAR WE OWN STANDS BEHIND THE GOODS WE MAKE

Amherst Foundry Co., Limited

General Offices and Factory: Amherst, Nova Scotia

WRITE YOUR NEAREST AGENCY

AGENCIES:

ONTARIO:
Monarch Brass Mfg. Co., 71 Brown St., Toronto

MANITOBA and NORTHWEST:
E. B. Plewes, 120 Lombard St., Winnipeg

Everything in Rubber

CANADIAN CONSOLIDATED RUBBER CO. LIMITED
DOMINION
RUBBER SYSTEM
AND ASSOCIATED COMPANIES

Made in Canada

Quality and Variety

PLUS

Value and Service

GIVE

Absolute Satisfaction

If you have not proved it, write to our nearest Branch or direct to Head Office for anything you may need in Rubber and see for yourself how we aim to serve and please you.

Canadian Consolidated Rubber Co.
LIMITED

Executive Office—Montreal, P.Q.

Branches at Halifax, N.S., St. John, N.B., Moncton, N.B., Quebec, Que., Ottawa, Ont., Toronto, Ont., Hamilton, Ont., Brantford, Ont., London, Ont., Kitchener, Ont., North Bay, Ont., Fort William, Ont., Winnipeg, Man., Brandon, Man., Regina, Sask., Saskatoon, Sask., Calgary, Alta., Edmonton, Alta., Vancouver, B.C., and Victoria, B.C.

READ WHAT THE LATE ELBERT HUBBARD said:—

"ONE-THIRD of all deaths on this continent are the result of lung-diseases, pneumonia and tuberculosis — the **Great White Plague.**

The chief cause of lung disease is dust.

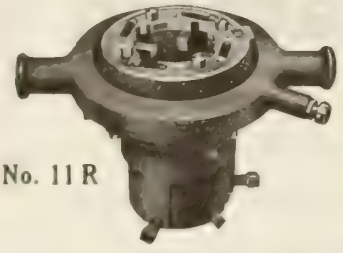
All occupations that render it necessary for the operators to breathe in dust have now come to be regarded as hazardous, and as such are frequently the subject of special legislation by our law-makers.

Sweeping with a broom is a most insanitary operation. It is therefore hazardous."

SANITARY ENGINEERS who sell and install TUEC Stationary Vacuum Cleaners not only make profit, but also make homes sanitary, which is impossible where "existeth the Broom."

THE UNITED ELECTRIC COMPANY

159 Richmond Street West, Toronto, Ontario



No. 11 R

"Jardine" Adjustable Ratchet-Threading Tool

Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions used in nests or fittings. Leading screw completely enclosed, excluding chips and dirt.

YOU CAN REDUCE THE LABOR OF PIPE THREADING 50 PER CENT., AND MAKE THREADS AS CLEAN AND PERFECT AS IF CUT ON A LATHE WITH ONLY ONE CUT WITH

"Jardine" and "Toledo" Pipe-Threading Tools

"Jardine" or "Toledo" dies spare the muscle of the man who does the work, and save money for the man who pays the wages, as they enable one man to do the work of two and costs less for repairs. No cams or jimcracks to wear and get out of order. Cutters that cut, don't squeeze. Set of cutters for each size of pipe. Lead screw ensures perfect pitch and form of threads. Adjustable to all variations of fittings, very durable cutters.

All threads finished at one cut. One man does the work of two.

It will pay you to look well into the merits of the "Jardine" and "Toledo" before placing your next order for tools of this kind.

Write for catalog and full particulars.

We'll gladly supply the names if you wish to have a chat with users in your town.

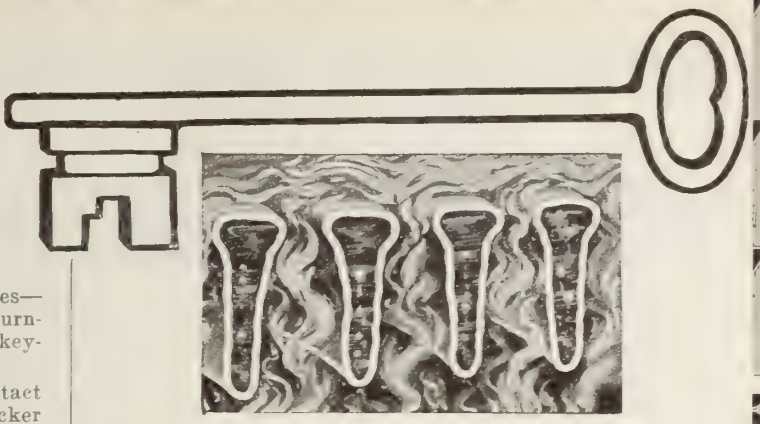
MADE IN CANADA

A. B. JARDINE & CO.

HESPELER, ONT.

Sole makers of "Jardine" Pipe-Threading Tools.
Sole licensees to manufacture and sell Toledo Pipe-Threading Tools in Canada.
Agents, Winnipeg and West—Stanley Brock, Ltd., Winnipeg, Man.
Brockville and East—J. R. Devereux, 233 St. James St., Montreal.

One of the Keys to Burnham Economy



Here we have part of four sections of a Square Sectional Burnham Boiler cut through.

Note how the waterways are shaped like keyholes—narrow where they come in direct contact with the burning flames, then larger at the top. And in this very keyhole shape lies one of the keys to Burnham economy.

For the thin amount of water coming in direct contact with the large amount of heated surface, means quicker heating on less coal. And the enlarged part at the top of the keyhole allows plenty of room for expansion and rapid frictionless circulation.

So it's easy to see how the Burnham "Keyhole" construction saves money for the man that owns the boiler.

If it saves money for him, it makes money for you. Makes money by making warm friends that tell their friends about you and the Burnham boiler you sell.

Our catalog tells about some of the other keys to Burnham Economy. Send for it.

Lord & Burnham Co. Limited of Canada

Builders of Greenhouses and Conservatories

(Boiler Department)

Royal Bank Bldg., TORONTO

Burnham Cosy Comfort Heat BB

Factory: ST. CATHARINES, ONT.

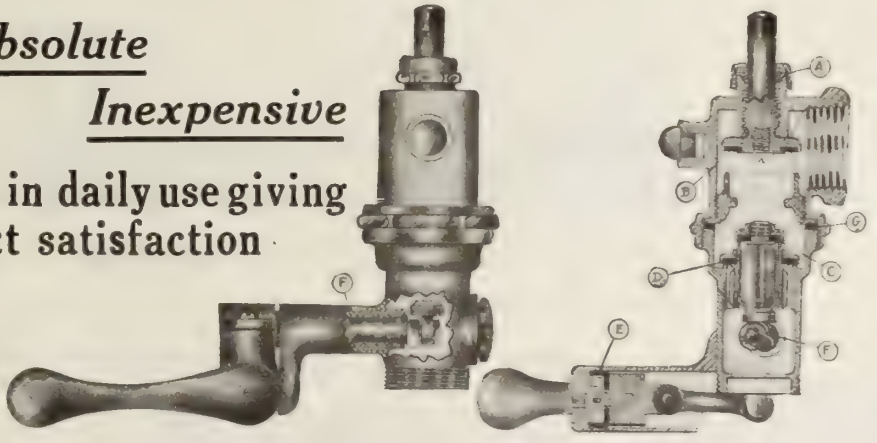
DIRECT FLUSH VALVE

Nickel Plated

Simple ***Absolute*** ***Inexpensive***

Thousands in daily use giving perfect satisfaction

Will operate perfectly with 1¼ in. supply on any pressure above five pounds to the square inch.



Note

No by-pass to become clogged.

Positive flush control by simple air valve in handle.

Only Three Working Parts.

Bronze Roller Cam to Lift Valves.

Combination High and Low Pressure Valve

Air Valve in Handle.

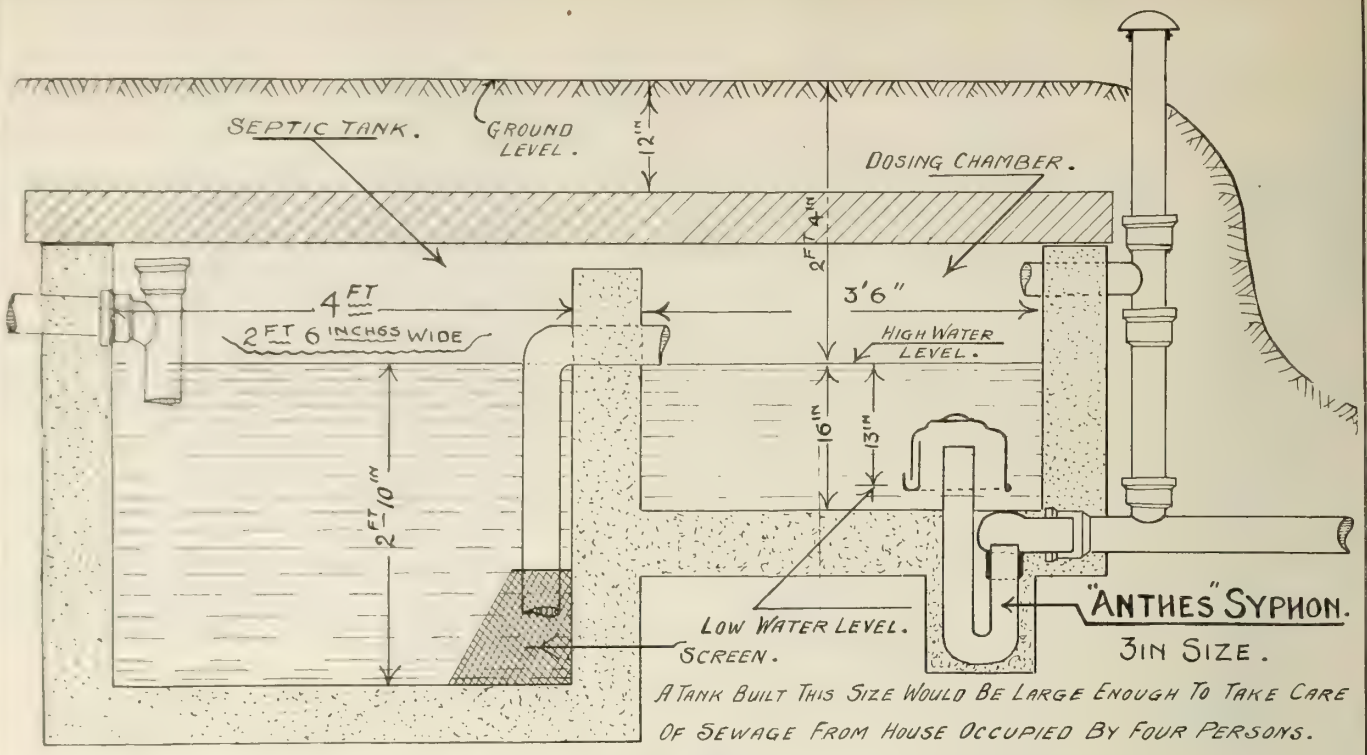
Independent cut-off—In case of repair only one fixture is affected.

Circulars, additional information, prices, etc., furnished upon request.

Canadian Wolverine Co., Limited

Manufacturers of Plumbing Specialties, Tools, etc.

CHATHAM, ONT.

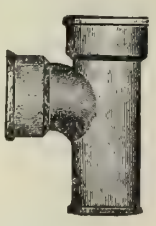


A TANK BUILT THIS SIZE WOULD BE LARGE ENOUGH TO TAKE CARE OF SEWAGE FROM HOUSE OCCUPIED BY FOUR PERSONS.

When You Buy "ANTHES" Syphons

YOU are only investing your money in something, which, when installed, "can never fail." Every syphon is unconditionally guaranteed to operate if installed as shown above.

IF you are in doubt about any sewage disposal problem, "ask us."



We manufacture a full line of high-grade cast iron soil pipe and fittings.

TORONTO **ANTHES FOUNDRY LIMITED** WINNIPEG

THIS SEAT WON'T CRACK

TRADE B.O.T. MARK

JOINTS RUN WITH THE GRAIN

Note the Long Inserted Spiral Dowells.

QUALITY is the basis upon which we build our products all of which carry a gilt edge five-year guarantee.

SERVICE is what we sell plus the finest material money can buy and expert labor can produce.

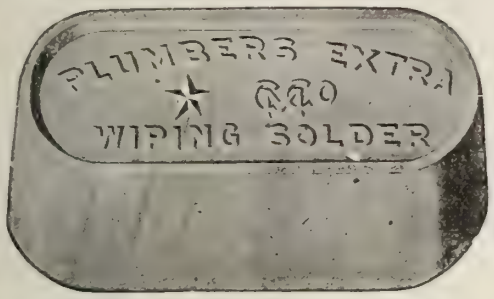
LOOK FOR THE TRADE MARK.

The B.O.T. Manufacturing Co., Limited

159-161 Richmond Street West, Toronto

We Sell Everything You Use

PLUMBERS' EXTRA STAR



HIGHEST GRADE WIPING SOLDER.
5 lbs. each.

Ask Us

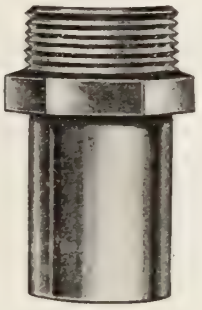
Patent Soil or Waste Pipe in lengths of 8 feet.

You cannot buy better lead waste pipe traps and bends in Canada than what we make. **And we make them.**

Even thickness and purity of metal is one of the outstanding features.

EASY WIPING SOLDER

THE PLUMBER'S FAVOURITE
SECOND ONLY TO OUR EXTRA STAR
7 lbs. each.



We make

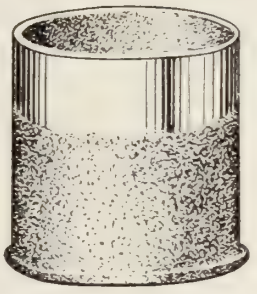
IMPERIAL Soldering Nipples

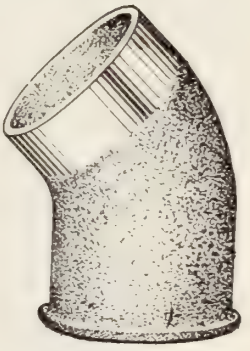
Without Doubt the Best Soldering Nipples You Ever Saw.

They Have Quality, Weight and Finish.

READ,
MARK,
LEARN

BRASS FERRULES





Our brass ferrules are high grade, free from sand holes, easy to tin, and sound in every detail.

Write for Catalogue "A"—Mailed Free.

We pride ourselves on being able to furnish the finest sheet lead in Canada in any length, width (up to 7 feet) and thickness.

THE CANADA METAL CO., LIMITED
Toronto

GOOD FILES TO USE—

—To a layman, all files look alike. But the skilled mechanic and practical shop superintendent will tell you they prefer to work with the "Famous Five" Files.

The steel in them is made from our own formulas, which have been proven best after years of investigation and practical experience.

They are nicely balanced.

Their cutting qualities are good.

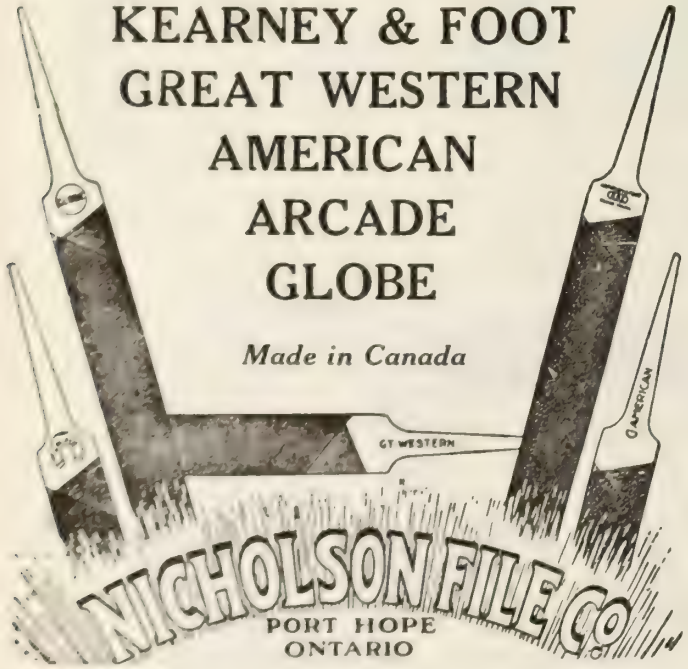
And there is such a wide variety of grades, that a superintendent or buyer can select from the line, the file he wants for any particular grade of work, and know that it will fulfill his requirements exactly.

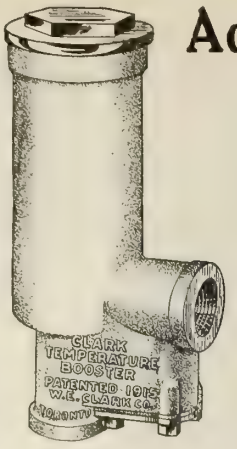
You probably are already using them. But it is just as well to specify the "Famous Five" when ordering.

They are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

Made in Canada





Advance in Price

Owing to the continued advance in raw material and labor, we are reluctantly forced to increase the price of the

CLARK Temperature BOOSTER

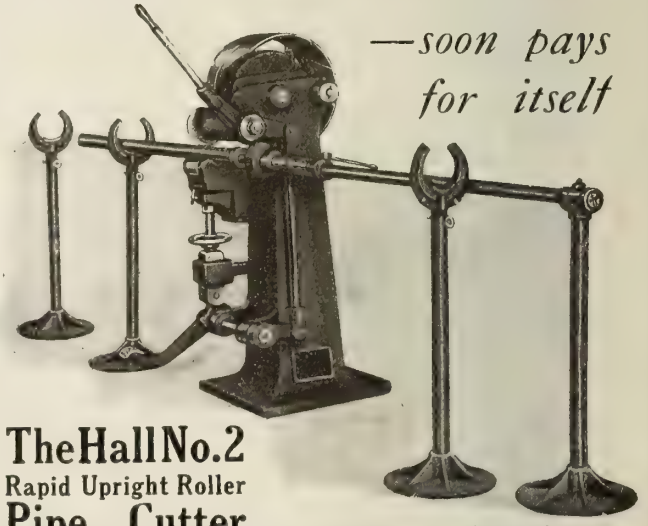
The new price is 40% off list.

The **CLARK TEMPERATURE BOOSTER** increases heat on any system and will positively cure that slow, sluggish system.

Made in Canada Only.

W. E. CLARK, Limited
719 King Street West - - Toronto

—soon pays for itself



The Hall No. 2
Rapid Upright Roller
Pipe Cutter

MADE N CANADA

Regular capacity ½ in. to 2 in., with extra cage will take ⅛ to ⅜ in. pipes. Cuts from 400 to 500 pieces of 1 in. pipe per hour.

IN A MEDIUM-SIZED SHOP IT WILL SAVE ENOUGH TIME AND PIPE TO EASILY **PAY FOR ITSELF IN LESS THAN TWO YEARS**, AND AFTER IT IS PAID FOR THE SAVINGS GO TO MAKE LARGER PROFIT.

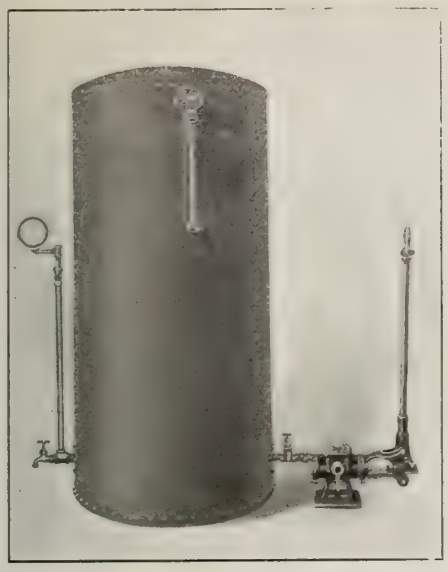
WEIGHT, 700 LBS.

INVESTIGATE THOROUGHLY **send for catalog and prices on all sizes, and let us put you in touch with users so that you will know how Hall ma... pleasing others.**

Delivery from stock. No delay.

JOHN H. HALL & SONS, Limited
BRANTFORD, CANADA

"When writing advertisers please mention that you saw their advertisement in the SANITARY ENGINEER."



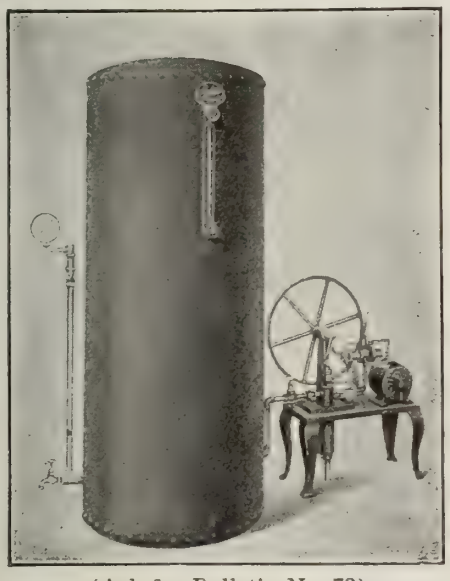
(Ask for Bulletin No. 65)

CANADIANS BY BIRTH

(NOT BY IMPORTATION)

112 Series Domestic Unit

YOUR CUSTOMERS will judge the merits of the hand-operated system you sell him by the **easy operation** and **efficiency** of the pump.
If our 016 pump is not twice as easy to operate as any other you've ever seen—return it. We'll send you your money without a question.
Fitted with patented "Q" Valves.
Can be taken entirely apart in 10 seconds.

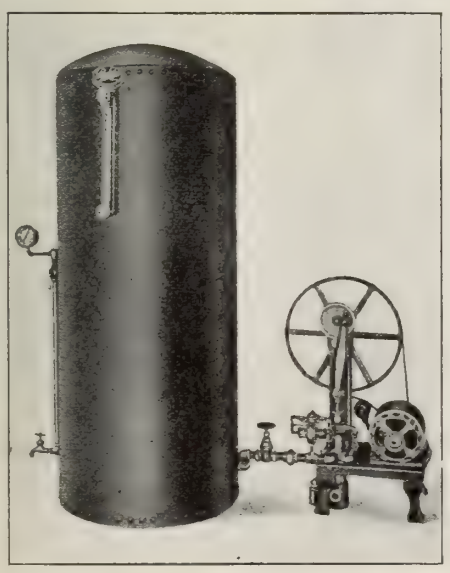


(Ask for Bulletin No. 73)

300 Series Domestic Unit

will deliver 125 *gals. per hour* at 40 lbs. pressure.

Automatic, silent, beautifully machined, and under a test made by an independent motor manufacturer, was shown to be the most efficient pump of its capacity made in America



(Ask for Bulletin No. 97)

500 Series Domestic Unit

There's no other pump in the world like this. A new principle, gears adjustable to take up wear. Automatically oiled, bronze bearings and double-acting, with only two valves, and it's "as silent as the foot of Time."

Capacity, 250 gals. per hour (125 gals. from deep wells).

WE MANUFACTURE

our own pneumatic, storage and special tanks of all kinds.

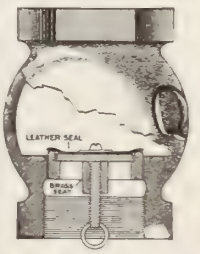
Our own complete line of peerless pumps.

Our own automatic electric controlling devices.

NATIONAL EQUIPMENT COMPANY LIMITED
TORONTO

Just take a look at that FOOT VALVE

It Just Can't Leak.



"Q" Foot Valve

The DUNHAM VAPOR HEATING SYSTEM

REPRESENTS THE HIGHEST DEVELOPMENT IN HEATING SYSTEMS

The DUNHAM VAPOR HEATING SYSTEM *gets at the root of most heating troubles and in doing so eliminates the hissing—spluttering—knocking radiator with annoying air valves.*

In Dunham Heating you have instead a noiseless, warmth and comfort producing unit without leaks and dirt or troublesome adjustments.

It is accomplished through the application of Dunham Packless Valves, (handy at top of radiator—one turn "on" or "off") and The Dunham Radiator Trap on the return end. This is it:

Allows the Dunham System to give out in real warmth every valuable heat unit of costly coal.

And then the automatic temperature control feature gives close regulation of temperature and fire.

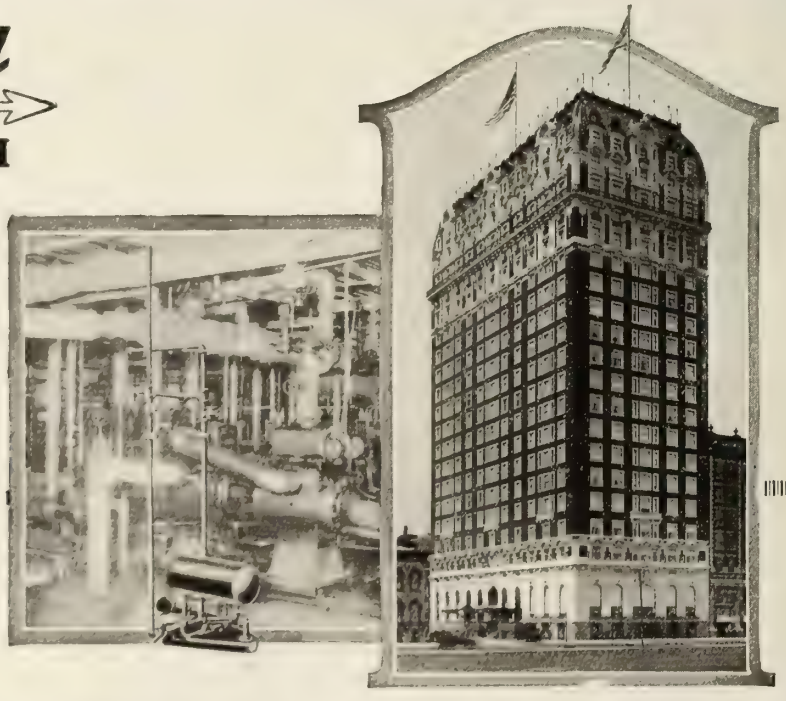
DUNHAM VAPOR HEATING SYSTEM *has many other advantages desirable in Home, Apartment or Store and Office Heating. It is making enthusiastic Contractor friends wherever adopted. May we send you Bulletin No. 11?*

C. A. DUNHAM COMPANY, LIMITED

TORONTO, CANADA

OTTAWA—214 Booth Building; MONTREAL—Room 20, 11 St. Sacrament Street; FORT WILLIAM—Plumbing & Engineering Supply Co.; HALIFAX—Eagar, Coombs & Co., Limited, McCurdy Building; VANCOUVER—520 Duncan Building; CALGARY—Metals, Limited; WINNIPEG—405 Tribune Building.

Morehead Back to Boiler SYSTEM



More Steam for Less Coal

THEY ARE WATCHING THE CORNERS in the steam plant of the famous [illegible] Hotel, Chicago—that are using the Morehead System to help hold down fuel charges. Sketch at left is shown draining the steam headers.

This battery is representative of the hundreds of leading hotels, office buildings, etc., in which the Morehead System actually saves money for the [illegible] by keeping the steam lines drained of all condensation—and returning it to the boilers as pure hot feed water—in just the condition to use with the least consumption of coal.

It may be used to the best for heating, drying, cooking, or simply for [illegible] the heating system without your costs. Write for complete details without

Canadian Morehead Manufacturing Co.

Dept. "C"

Woodstock - - Ontario

388

OSBORNE HOUSE, ISLE OF WIGHT
FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

ROYAL PALACE OF LA MAGDALENA
SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN

SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

Standard Sanitary Mfg. Co.
Limited

General Offices and Factory: Royce and Lansdowne Aves., Toronto, Ontario

TORONTO STORE
55-59 Richmond Street, West

HAMILTON STORE
20-28 Jackson Street, West

BALMORAL CASTLE
SCOTTISH RESIDENCE OF THE KING AND QUEEN OF ENGLAND

THE QUIRINAL
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ITALY, ROME

BUCKINGHAM PALACE
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ENGLAND, LONDON

PALACE OF THE KING OF THE BELGIANS
BRUSSELS

SANITARY ENGINEER

PLUMBER AND STEAMFITTER OF CANADA

Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, NOVEMBER 1, 1916 No. 21

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EDITORIALS

Humidity a Necessity—Be a Merchant—Editorial Briefs

The MacLean Publishing Co., Limited

JOHN BAYNE MACLEAN, *President* ESTABLISHED 1887 H. T. HUNTER, *Vice-President*
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SANITARY ENGINEER, PLUMBER and STEAMFITTER of CANADA

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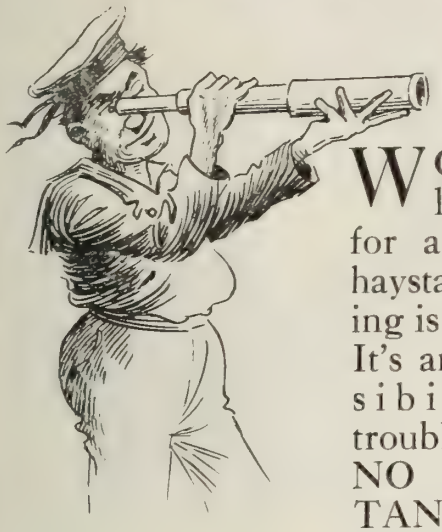
GREAT BRITAIN—London—The MacLean Company of Great Britain, Limited, 88 Fleet Street, E.C. E. J. Dodd, Director. Telephone Central 12960. Cable Address: Atabek, London, England.

UNITED STATES—New York, R. B. Huestis, 115 Broadway, N.Y., Telephone Rector 8971; Chicago, Ill., A. H. Byrne, 1104-5-6-7 Fort Dearborn Building, 105 West Monroe St., Telephone Randolph 3234; Boston, C. L. Morton, Room 733, Old South Building, Telephone Main 1024.

LOOKING FOR TROUBLE IN A "VITRO" TANK



WOULD BE like looking for a needle in a haystack, as the saying is.
It's an utter impossibility to find trouble in the only NO TROUBLE TANK ON THE MARKET.

VITRO TANKS are made from a combination of nature's products, by a special process. Such as is not adopted in making any other tank.
NO linings to leak. No joints to open, and are fully guaranteed against all defects in material and workmanship.
Let your next order for tanks be for VITROS.

EVERY FITTING TESTED Sold by every jobber in the Dominion. **EVERY TANK GUARANTEED**

Over a quarter of a million VITRO tanks now in use.

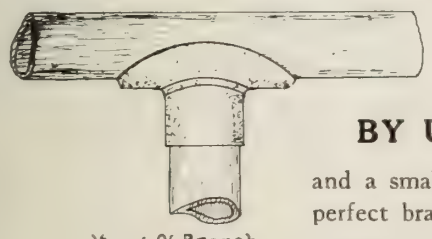
AGENCIES:

MARITIME PROVINCES—The Jas. Robertson Company, Limited, St. John, N.B.

QUEBEC PROVINCE—Mechanics Supply Company, Limited, Quebec, Que.

Cluff Manufacturing Company, Limited

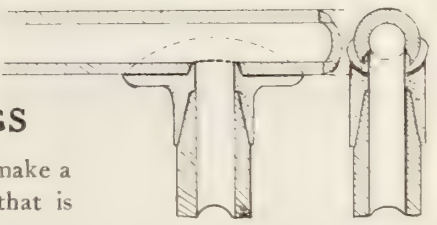
81-111 STERLING ROAD, TORONTO, ONTARIO


View Of Branch

The Scientific Metal Jointer

BY USING OUR LEAD FITTINGS

and a small piece of AMALGALINE, you can make a perfect branch in a scientific manner. A joint that is stronger, more durable and acid proof.


Sectional View & Plan

NOTE THE NEATNESS OF THIS BRANCH JOINT

It requires true skill to make this joint along with Amalgaline. Don't think for one moment that a botcher can do it.

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AN ASTOUNDING FACT

OUT of 400 farm homes only 10 were fitted up with a complete outfit of plumbing fixtures.

ONLY about 25 had a W.C. in their home and only 65 had water piped to the house in spite of the fact that such appliances are of the first importance and are demanded in a city home.

Farmers Have Money For Luxuries

THE above assertions are proved by the following report recently issued by the Commission of Conservation, from which the following figures are also taken:

86 out of every 100 own farms of 126 acres.
232 of these farmers have a telephone in their homes.
20 are automobile owners,
and 126 out of the 400 have either a horse and buggy or an auto for pleasure.

NOW, Mr. Sanitary Engineer, don't you think there is more need of plumbing fixtures on a farm than an Auto? The auto salesman would not even attempt to side-track such a question with "No." Such being the case it is up to you to go after new business. Sell him a complete sanitary equipment which will make him a more efficient farmer, happier and healthier.

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THE SANITARY ENGINEER

VOL. X. NOVEMBER 1, 1916 No. 21

A Discussion on Credits and Discounts

Competition is Not the Life of Trade, but Rather Co-operation.

BY ONE OF US.

Article V.

MANY of us have been taught that competition is the life of trade; that it is essential to the continuance and progress of the race; or, as Herbert Spencer puts it: "Society flourishes by the antagonism of its atoms."

But the visible golden truth is that co-operation is good, and competition is bad, and society flourishes only by the mutual aid of human beings. The more truly human the less antagonistic competition is in evidence.

No one believes that a house divided against itself will stand. No country can prosper if its people and its government are at bitter variance with each other. Or when one party's business, conduct or relationship appears to be that of blackening the other, one must fall, or else the people rise up and demand a greater amount of co-operation for the national good.

In play as in business it is all the same. A hockey team, a baseball team, a regiment, a ship's crew, a school, or in a large industrial concern, "antagonism of atoms." Why, the very thought would mean defeat and failure.

Everyone will admit that if men are to plan cities, build them and govern them; build bridges, make roads, establish universities, sail ships, and make their business a success, they must work together for the common good of all, and not against each other, which, in other words, is competition.

Surely these arguments are clear enough. Bees do not kill; they have no competitors, and do not compete with each other. One set carry water, another set makes wax, and so on in turns. And, in a word, they co-operate; they make honey.

Co-operation, Not Competition, is Success for All

Now, what are the essentials in our trade to-day, the most vital essentials—competition? Price-cutting? Giving and receiving unlimited credit? No, a thousand times no. We need more co-operation, not for our own selfish gain, but for the mutual good of all with whom we come in contact. It might be asked, with whom shall we co-operate? With, first of all, our source of supply, the manufacturers, the jobbers and the journeymen, to whom we look for our labor and material.

Next we should co-operate among ourselves, and this with a view of giving fair and honest service to our customers.

Note what I said, "fair and honest service." Service is not fair and honest if we give a service that is not fair and honest to oneself.

The person who neglects his physical self and brings about, say, an infectious disease, may or may not recover; but he may also be the cause of another person contracting the fell disease, which may prove fatal.

The same in business. One person may start up in business. He may be getting unreasonable credit, and may use it for such a period, during which time many a weaker or smaller business may be driven to the wall, even though he be perfectly honest.

Honesty is a two-edged sword. One cannot rob himself in his endeavor to give service. The big mail order house is the blackest blight on honest, legitimate business. Why? Because they create an unnatural, unnecessary appetite in the person possessing cash, and the proof of this assertion can be found in the junk pile, the garbage can, and the home.

At least 60 per cent. of the mail order and department stores' goods are inferior goods or shoddy, goods that do not wear or last sufficiently long to give cash service value. And why such businesses? Competition. Why is there such a large amount of repairing done in the sanitary and heating trade? Competition, ruinous competition. Why can we find low price, cheap jobs being installed to-day? Competition.

The jobber or manufacturer who wilfully gives credit to men who do not know how to conduct a business is guilty of not only hanging a millstone round the neck of the debtor, but is also actively engaged in "antagonizing the atoms," antagonizing those atoms, his cash customers; and those cash customers have but one course to pursue, and that is to cut them off. The writer knows whereof he speaks; indiscriminate credit is ruinous to any business, though it may not act to as great a degree with the creditor as the cash customer.

I firmly believe that if all sources of supply for material were to take a leaf out of labor's book, demand a day of settlement, just as the periodical pay-day, business would be better for all concerned.

No wage-corner would work for a man who could not pay or did not pay up upon some predetermined day. And material is largely the outcome of labor.

(Continued in next issue.)

Editor of SANITARY ENGINEER:

Your articles in recent issues of the SANITARY ENGINEER on Credits and Discounts are certainly along the right lines and should be read and digested by all the responsible members of the heating and plumbing trade. Please continue the discussion in future issues as I think a great deal of good can be done by SANITARY ENGINEER along this line

Yours sincerely,

F. H. GENTLE,

President.

Toronto Society of Domestic Sanitary and Heating Engineers.

Data Relating to Heating Systems

The Time to Study Heating Systems and Their Requirements is When Such Installations Are Being Installed—Many a Splendid System When Being Installed, Has Been Ruined on Account of There Being Very Little Grey Matter Used.

BY T. W. REYNOLDS.

MODULATING or graduated control valves cannot be used on an ordinary gravity return pipe system unless the latter is either vented to the open or operated under a vacuum. The partial throttling of the supply to a radiator would produce a lower pressure in same, thereby resulting in back pressures from other sources. Pressures above atmosphere may be used in connection with the vented system, providing the vent pipe is equipped with a swing check valve set to close against any pressure in the system.

The usual air valve (that most annoying of all contrivances, heretofore regarded as a necessary evil) is not required on the radiators, all of the air being sucked out of the system by the vacuum pump C, but a return-line valve G, designed to close when steam hits it, is used to prevent steam passing into the return line, and from there through the vacuum pump C. A similar "drip"

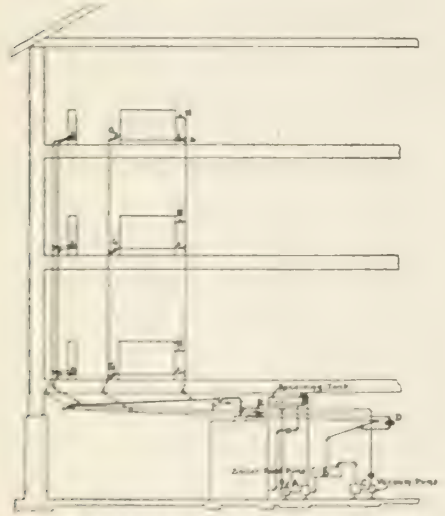


FIG. [illegible] VACUUM-STEAM MECHANICAL VACUUM SYSTEM, TYPE "A."

valve D is used at the end of the steam main which allows air and water to pass into the return, but closes against the passage of steam. Located above the vacuum pump C and the feed or return pump A, it is desirable to have a "separating" tank L, which separates the air and water from the return lines.

Certain admirable features are possessed in a similar system (see Fig. 9).

The amount of vacuum carried is controlled by means of differential weighted check valves (with orifices restricted in accordance with their capacity), in-

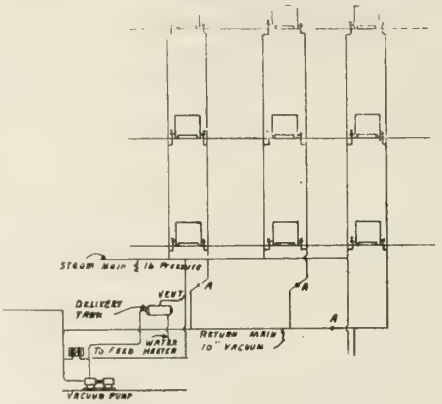


FIG. 9. VACUUM-STEAM MECHANICAL VACUUM SYSTEM, TYPE "A," USING SPECIAL VACUUM CONTROL VALVES.

stalled on each branch return, and "Impulse" valves on the return end of each radiator; the latter valves have been already described under gravity two-pipe systems. In the cut (see Fig. 9) are shown differential valves, one on each return riser. These are weighted to open at about five pounds difference in pressure.

The loss of pressure, due to the friction of flow in the steam and return mains, varies in accordance with the distance from the boiler, or amount of vacuum carried on the system; therefore, each valve is weighted to correspond to the difference in pressure at the point of its installation. The objectionable features usually present in many systems, that of short circuiting, heating only of those radiators which are nearest the source of supply, etc., are herein avoided, due to the valves which are so weighted, all lifting and discharging equally into the main return, irrespective of their distance from the boiler or from the vacuum pump.

The type B mechanical vacuum steam system (Fig. 10), may be either of the one-pipe or two-pipe plan constructed on the ordinary gravity principle. The condensation from the radiators and pipes is returned to the boiler by gravity. In this system, and "air line" is run from each radiator to a pump or aspirator vacuum producer in the basement. This air line is constructed of small size pipe connecting the air valves A which are designed to allow air to pass out of the radiator, but which closes when steam reaches them. The supply valves B should be of the packless type suitable for steam heating work. The aspirator is usually connected with some source of power such as the city water pressure and may be arranged so that a vacuum of 5 or 10 inches is automatically maintained in the air lines.

The principal advantages of the mechanical vacuum systems of steam heating over the ordinary gravity systems is the wider range of temperature which may be maintained in the radiators and the more positive circulation of steam through the system with less back-pressure upon the steam using machinery. Pipe sizes can be much smaller because of the greater differential pressure than is present in the ordinary gravity system. The extra cost of modulating and vacuum valves is partially offset by a sav-

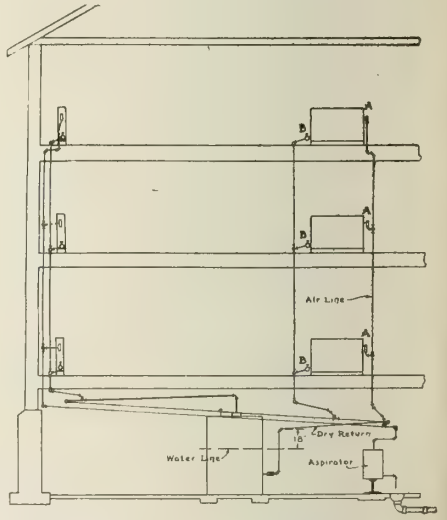


FIG. 10. VACUUM-STEAM MECHANICAL VACUUM SYSTEM, TYPE B.

ing due to the reduced sizes of pipe and the elimination of air valves.

This type of vacuum system works as an ordinary one or as a two-pipe steam installation except that all of the air relief valves are designed to permit the air to be forced from the system under one or two ounces of pressure but which close against the entrance of air from

Rural Sanitation

A Continuation of the Sanitary Science Course That Has Been Appearing in the Sanitary Engineer, But Having Particular Reference to the Sanitary Disposal of Household Wastes in Unsewered Districts.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 13

Sub-surface Irrigation on Steep or Irregular Ground

THERE are occasional conditions of soil and topography or lay of the ground that require the disposal tile bed or field to be laid on a steep hillside. These conditions, in the experience of the writer, have been avoided by a careful selection of the site; any acquaintance with the design of the layout of disposal tile under a steep sloping ground surface is from reading and deduction only. Such designing being, however, sometimes necessary, several suggestions for absorption beds for rough ground are shown from which the reader should be able to choose something suited to any particular condition.

The object to be attained is an equal distribution of sewage throughout the tile system. With sufficient tile provided to take all the sewage from the flush

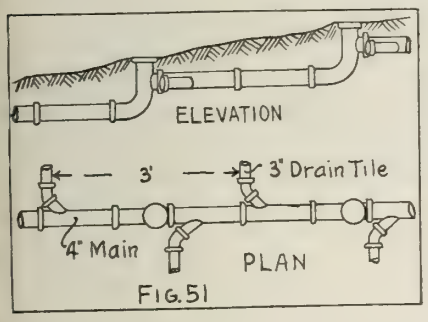


FIG. 51

tank this might seem easy of accomplishment whatever the velocity of the entering sewage or the layout of the runs of tile. But without special provision the general results of the high velocity of the sewage would undoubtedly be that one or two runs of tile would be quickly filled with sewage, some of which would be forced to the surface, while other runs of tile might receive little or none, a very undesirable condition.

The velocity of sewage flowing in a steep main from the flush tank may be partially checked by reducing the grade of the main, when within 20 feet or more of the absorption bed, to not greater than 4 inches in 100 feet. If the bed itself is to be laid in level ground no other provision may be necessary.

When, however, it is necessary or desirable to arrange the disposal tile on a

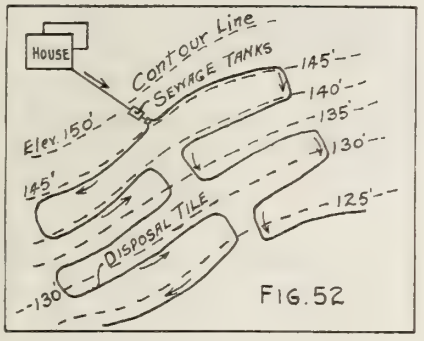


FIG. 52

hillside, the mains and tile must be laid with a view to reducing the velocity of the sewage so that it may flow into all the runs of tile and also be prevented from breaking out at the ends of the runs of tile at the surface of the ground.

An equal distribution of sewage and the generally necessary reduction of the velocity in an absorption bed on steeply sloping ground have been accomplished, or the means for accomplishment suggested, in various ways involving different principles.

Fig. 51 illustrates a principle first described as far as the writer knows, in the "*Engineering Record.*" It has frequently been referred to in books on the subject of sewage disposal. As shown, special drops of vitrified pipe with hub and spigot ends are needed. The branches would also have to be specials, as the invert of the 3-inch branch is at the same level as the invert of the 4-inch main pipe. A method involving this principle has been described by J. J. Cosgrove as follows:

"When it is necessary to lay out a subsoil disposal field on a hillside it is not advisable to run the main distributor to the field on a steep pitch, but it is better to run it level, or with only a slight fall, stepping down whenever necessary. The method of taking care of

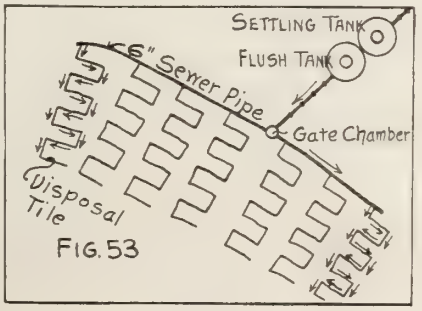


FIG. 53

the fall by a series of steps instead of a uniform grade has certain advantages with which it will be well to be familiar for they mean much in the successful operation of a plant.

"It will be noticed, for instance, that as the sewage gains momentum and force, and flows into the first offset or step, the sewage will be dashed against the downgrade side of the upright portion of the pipe and its momentum or velocity momentarily arrested and generally somewhat reduced. Gaining momentum in the next horizontal stretch, it is likewise dashed against the downgrade side of the second step, and so on to the end of the line, each step retarding the flow so the sewage will not travel like a battering ram to the low end of the line and then drive through the surface of the ground . . . Branches are taken off for the filter bed just before each drop in the main line. When

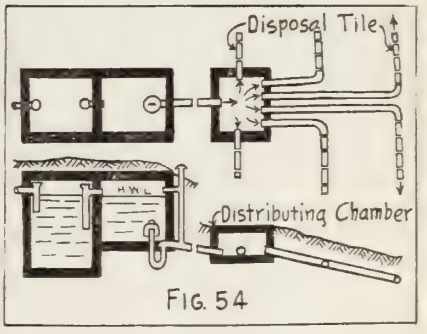


FIG. 54

the flow of sewage is arrested, the fluid is backed up temporarily, thereby raising the water line in the main pipe so a fair proportion will flow into the branch pipes. At the same time there is no excess pressure at the mouth of the branch pipes, so that the sewage will be distributed throughout the entire underground system."

Fig. 52 illustrates a method thus explained by Theodore Horton, C.E.:—

"Lay out the entire system in one or two continuous lines with a series of short, steep and long gentle slopes. Thus, starting at the upper end, the line would first run down the steep slope to the next lower contour; then turn and run along this contour line with a gentle slope to the opposite end of the field; then turn a right angle and run down the steep slope to the next lower contour, and so on. The path of the sew-

age effluent would thus be back and forth over the field through the different levels and it will readily be seen that there would be no tendency of the sewage to accumulate under pressure at any point and break out upon the surface."

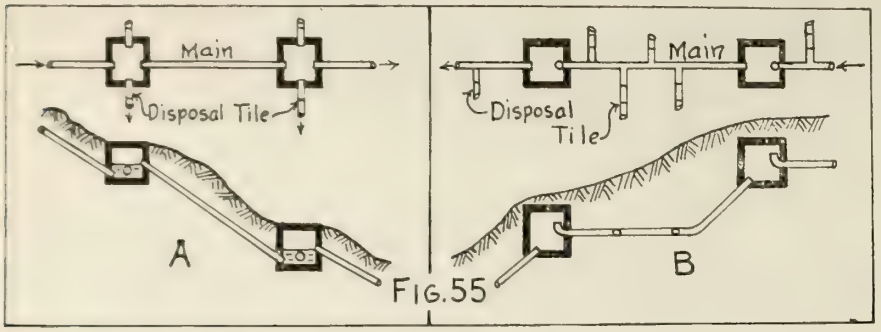


FIG. 55

A variation of the method shown in Fig. 52, but involving the same principle, is described by Elmina T. Wilson, C.E., in reference to an actual installation (see Fig. 53), as follows:—

"The distributing system was located on a very steep sidehill, which accounts for the method of laying the drains, so as to have the branch lines of about the same length, and the average fall not much more than 2 inches in 100 feet. The 6-inch sewer pipe is laid with cemented joints, with a fall of 4 inches to the 100 feet each way from the dividing chamber."

Fig. 54 is illustrative of yet another method for equalizing the flow of sewage in the various runs of tile, which method is applicable for level as well as sloping ground. Before the sewage from the flush tank enters the absorption tile it flows into a chamber which may when convenient be built as an addition to the settling and flush tanks. From this distributing chamber mains of varying length, when the ground is sloping, lead to runs of absorption tile all equal in length but placed at various levels to suit the ground.

Fig. 55 has been compiled from two different sources and shows two ways of accomplishing a somewhat similar result. For method "B," some of the glazed tile must have, as shown, a turned up end, but it is more convenient to take off a large number of rows of tile than by method "A."

The methods suggested in Fig. 55 seem a more positive means of insuring that each row of tile gets its proportionate share of sewage than does the method shown in Fig. 51. If, however, the special "drop" is replaced by the special pipe shown in Fig. 56 and described on page 18 in the SANITARY ENGINEER for March 15, 1915, the advantages of each and all methods are retained.

Last, but certainly not least to be described, is the method shown in Fig. 57. On the same principle a single bed may be more easily laid out, as fewer fittings are required. The reason the row of tile from main at "A" fills first is due to the fact that the velocity of the sewage naturally carries most of the liquid past the opening at the Tee, just as water will run down a board without spreading out to any extent. As soon as all the tile in run "A" are full, then, if the bed is properly designed, all the sewage should flow into the next row of tiles. The steeper the slope the more certain is the sewage to flow past the Tee at "A," which can, however, if desired, be tilted up a little or even so much that the highest part of the invert of the elbow taken off Tee is at the same level as the top of the tile in run "A." This last change, then, evidently provides a means of accomplishing

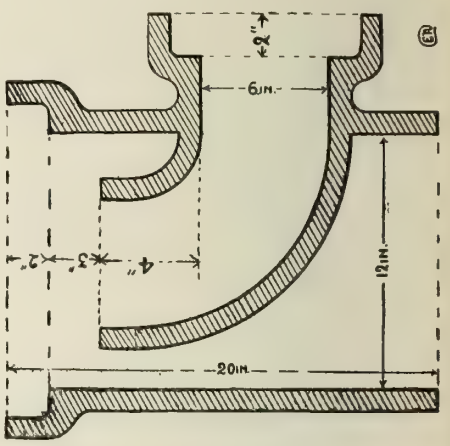


Fig. 56.

easily and cheaply without special fittings, the object to be attained by various other methods shown.

(Continued in next issue).

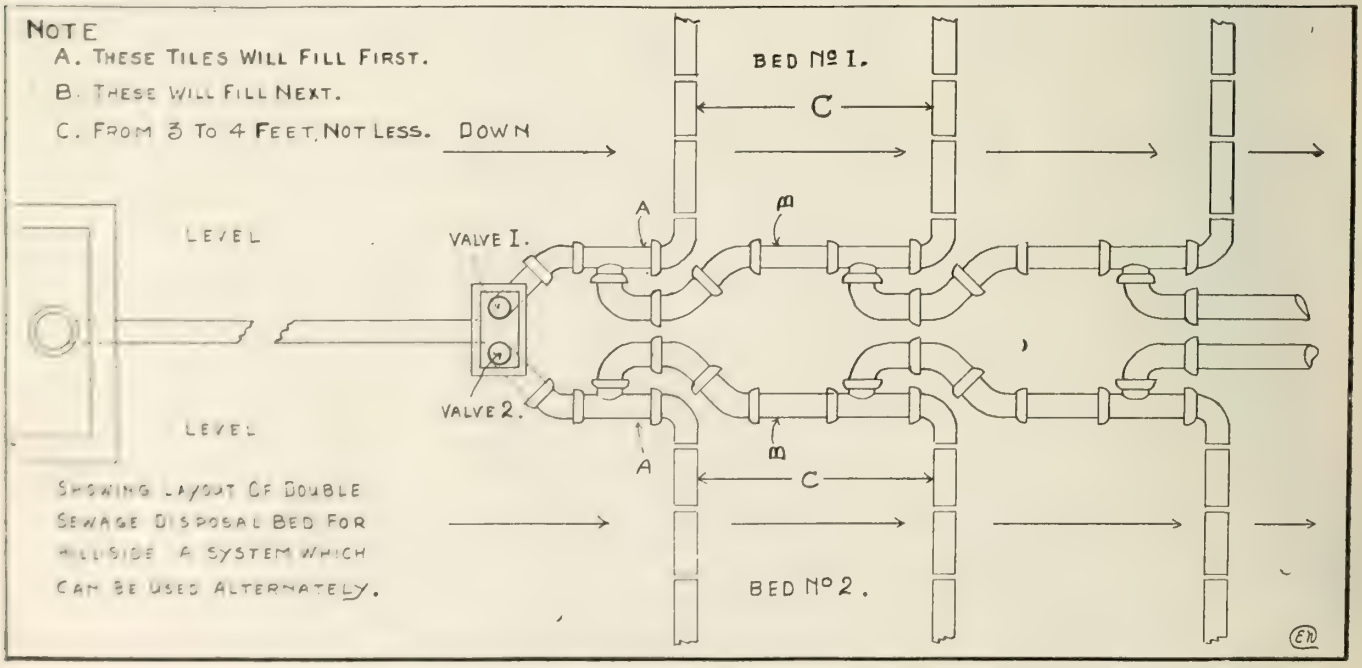
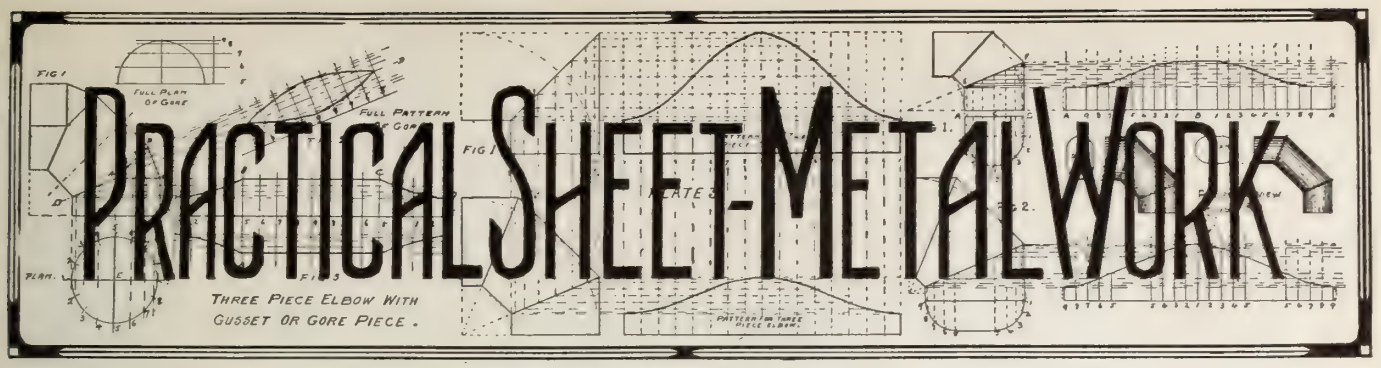


Fig. 57.



BY THOMAS STANFIELD

THIS article will take up a number of simple problems in geometry, which will not only be interesting, but also instructive, in that it shows how various figures may be developed. Such practice will assist the student materially when the actual development of patterns is taken up.

Fig. 1.—To Erect a Perpendicular Line

Let AB be a horizontal line. With A as centre and with AB as radius describe a circle, then with B as centre and with BA as radius describe another circle, cutting the former circle at C and D. Join CD cutting AB at F.

DC is perpendicular to AB. The four angles at F are right angles, 90 degrees each. The line AB is divided into two equal parts at F. And any circle drawn with F as centre is divided into four equal parts by the lines AB, CD.

Another method of erecting a line perpendicular to another given line from a point at the end of that line is shown in Fig. 2.

Take any point above AB, such as C. With C as centre and CB as radius, describe a circle cutting AB at E. Join EC and produce EC to cut the circumference of the circle at D. Join BD, BD is at right angles to AB.

Fig. 3.—To Draw a Straight Line Parallel to a Given Straight Line

Let AB be the given straight line. Take any two points in it, a and b, and from them draw aC and bD of equal length at right angles to AB. Through C and D draw the straight line EF. EF is parallel to AB.

Another practical method is to describe two arcs, as shown with a and b as centres, then draw EF to touch the two arcs at C and D, but not to cut them. EF is then parallel to AB.

Fig. 4.—To Bisect a Given Angle

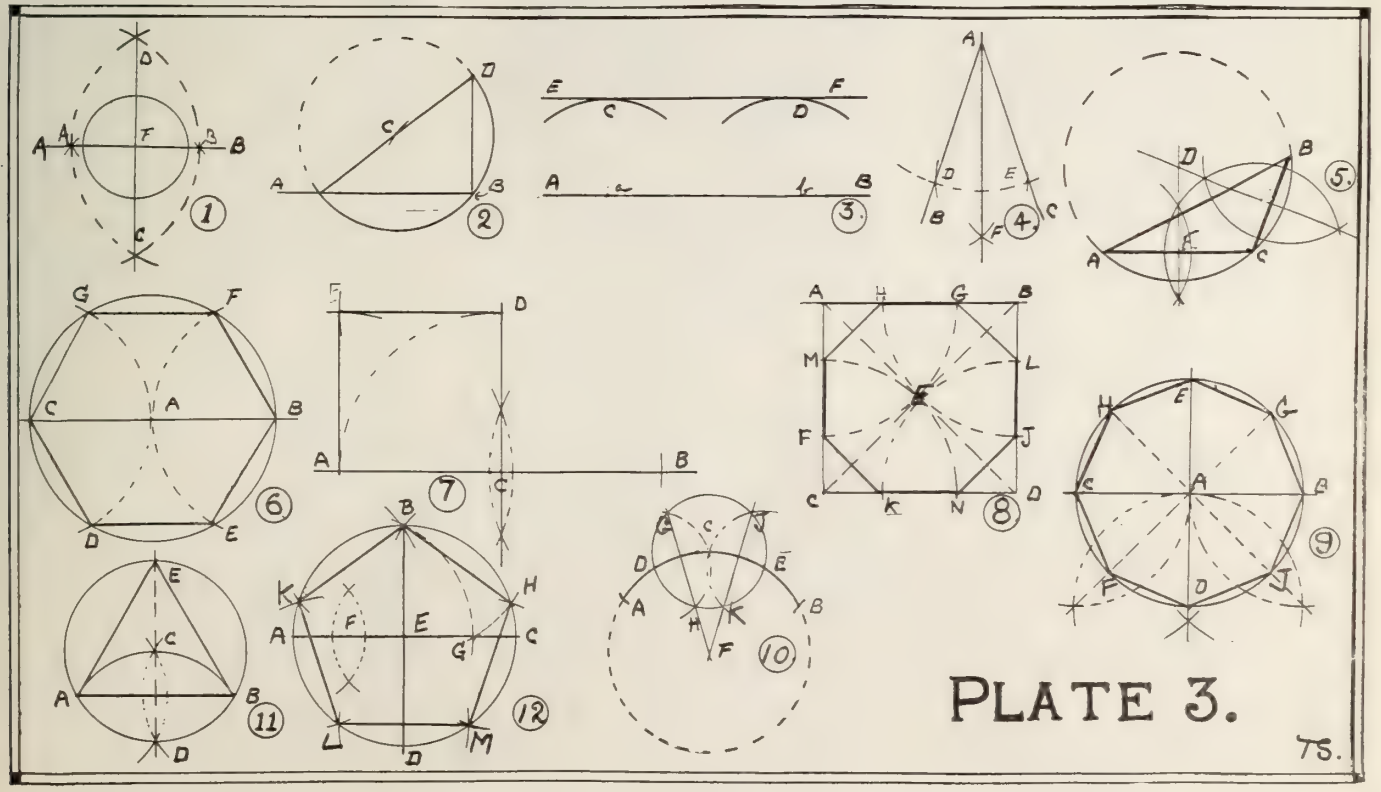
To bisect an angle means to divide an angle into two angles, each having the same number of degrees. It should here be mentioned that the size of an angle does not depend upon the length of the lines forming it, but upon the size of the opening. Thus, the angle formed by the hands of a clock standing at 5 minutes past 3 is greater than that formed by them at 10 minutes past 3, although the hands in the second case might be much larger than those in the first case.

Let BAC be the angle to be bisected. With A as centre and with any radius less than AB describe a circle cutting AB and AC at D and E respectively. With D and E as centres and with radius DE, describe two circles (parts only are shown in the figure) intersecting each other at F. Join AF. The angle DAF is equal to the angle CAF.

Fig. 5.—To Draw a Circle Through the Three Angles of any Given Triangle

Let ABC be the given triangle. It is required to describe a circle of such a size that the circumference may pass through the three points ABC.

(Continued on page 30.)



Market Conditions and Tendencies

Statements Regarding the Prices and Tr end of Supplies.

THE MARKETS AT A GLANCE

One of the most spectacular advances during the week has been in the price of pig-iron which advanced suddenly $2 to $3 per ton. Some lines of brass goods have also advanced further. Soil pipe and fittings have also advanced.

Galvanized sheets and all products which are manufactured from them are very firm. Prices for sheets, will, it is thought, be a great deal higher by spring than at the present time. In fact, further advances in the immediate future would not come as a surprise.

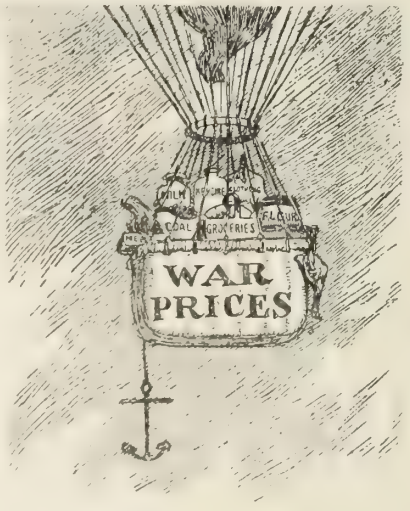
All lead products remain firm at high levels. Oakum remains firm and high in price. Advances have also taken place on linseed oil, wire nails, stove pipe wire, candlewick. There has been a revival in the demand for copper and most other ingot metals. Prices remain firm at high levels. Trade generally is slack, especially in the larger cities. Small town and country trade continues about normal.

TORONTO, Oct. 31. The cost of supplies still has an upward trend, and a number of advances have gone into effect since last issue. There has been some improvement noticed in business generally. Trade, however, is quiet except in some of the smaller towns surrounded by good agricultural districts. The metal markets continue firm and steady. Iron and steel markets are advancing with little semblance of restraint. The demand for steel is as insistent as ever. Present indications are that the heavy demand will continue far into next year. One of the most remarkable movements of late has been the breaking loose of the pig iron market after months of lagging. There has been a scramble in some sections for iron and prices have advanced from $2 to $3 per ton. The rapid advance in the price of coke has brought about a new and serious situation in the manufacture of pig iron. A shortage of labor and cars in the Connellsville district is one of the principal causes of the rapid advance in coke prices.

Further Advance in Prices of Valves

A further advance has gone into effect on some lines of brass goods. The advance is approximately 10 per cent. Cost of labor and raw materials as outlined in the last report are largely responsible for the advanced prices. The [illegible] discounts are as follows:—

Ground work, 50 per cent.; standard compression work, 49 per cent.; high grade compression work, 53 per cent.; cushion work, 45 per cent.; filler works, standard, 59 per cent.; high grade, 52 per cent.; basin cocks, No. 0. Standard 58 per cent., high grade, 52 per cent.; No. 1 and 2—Standard, 54 per cent., high brade, 46 per cent.; bath cocks, 60



per cent. Flateray stop and waste cocks are quoted, standard, 58 per cent., high grade, 35 per cent.; rounderay, standard, 58 per cent., high grade, 55 per cent. Standard globe, angle and check valves are quoted as 35 per cent. off, high grade at 30 per cent..

Radiator valves, high grade, are quoted at 35 per cent. and standard at 45 per cent.; patent quick opening valves are quoted at 65 per cent.

Copper, one of the chief metals governing prices of brass goods, continues firm at high levels.

One authority on copper states that the only feature in the situation that can be construed as at all bearish is the theory, which has been advanced by one most thorough and practical student of the situation, that the ammunition requirements of the allied nations of Europe already have been covered far in advance. If this belief is correct, it possibly means that a somewhat smaller amount of copper will be needed from month to month for the manufacture of munitions during the remainder of the war. To offset this, however, attention could be called to the fact that there was at least 300,000,444 pounds and probably 400,000,000 pounds surplus at various points in the world immediately after the war began, and it also could be pointed out that recent developments in the fighting zone indicate that the war will be fought even more fiercely and with heavier expenditures of ammunition in the future than in the past.

The maintenance of the present high level of prices unquestionably is dependent to a considerable degree upon the war demand, notwithstanding the probable fact that approximately two-thirds of all the copper going to market is absorbed by industry. High prices almost always are, the result of an excess of demand and the present excess demand for copper unquestionably is for munitions.

The present outlook encourages the belief that the price of copper will average as high as 17 or 18 cents for several years after the war ends. It seems to be reasonably certain that 25 to 27 cents a pound (based on U. S. prices) will be realized by producers for their 1917 product, and as yet there is no reason to doubt that approximately this price level will be maintained throughout the greater portion of 1918.

Soil Pipe and Fittings Advance in Price

The discounts on soil pipe and fittings have been reduced. Medium and extra heavy pipe up to and including 6-inch, are now quoted at 60 per cent. off instead of 65 per cent. as formerly. Medium and extra heavy fittings up to and including 6-inch., are now quoted at 65 per cent. instead of 70 per cent. as formerly.

Four inch medium soil pipe S. H., is

quoted at 23 4-5c ft. Eight-inch soil pipe remains unchanged at 45 per cent. off.

Black and galvanized iron pipe remains firm at the prices quoted in last issue and as shown in the table which follows. However, there is every indication of higher prices going into effect before long. The price of skelp has advanced sufficient to cause prediction of higher prices on pipe. Prices in effect the time of writing are as follows:—

Buttweld.	Per 100 ft. Black	Galv
⅞ in.	$ 5.50	$ 5.00
¼ and ⅜ in.	3.18	5.31
½ in.	4.08	5.65
¾ in.	4.95	7.07
1 in.	7.31	10.46
1¼ in.	9.89	14.15
1½ in.	11.83	16.91
2 in.	15.91	22.76
2½ in.	25.16	35.98
3 in.	32.90	47.06
3½ in.	39.56	56.58
4 in.	46.87	67.04
Lapweld.		
2 in.	17.76	24.24
2½ in.	26.33	36.56
3 in.	34.43	47.81
3½ in.	41.40	57.50
4 in.	49.05	68.13
4½ in.	59.69	83.19
5 in.	69.56	96.94
6 in.	90.24	125.80
7 in.	121.40	165.40
8 in.	127.50	173.80
8½ in.	146.90	200.20
9 in.	176.00	239.80
10 in.	163.20	222.40
10 in.	210.10	286.30

Prices Ontario, Quebec and Maritime Provinces.

Cast iron pipe fittings are quoted at 50 per cent. and malleable at 25 per cent.

Pig lead remains at the high figures given in last week's issue and the market at present is firm. There is a disposition in some quarters to exaggerate the strength of the market.

Lead sheets are still quoted as follows:—

3 lbs. sq. ft.—$11.75 per 100 lbs.—$12.50, cut to sizes.

3½ lbs. sq. ft.—$11.75 per 100 lbs.—$12.50, cut to sizes.

4-6 lbs. sq. ft.—$11.50 per 100 lbs.—$12.25, cut to sizes.

Lead pipe is quoted at 13c and lead waste pipe at 14c. Traps and bends are quoted at 10 per cent. off list. Lead fittings are quoted at 70 per cent. oc. Wiping solder is unchanged since last report and is quoted from 23¾ to 26½c lb., according to brand. Bar solder remains firm and quotations range from 24¾c for commercial, to 28½c for guaranteed.

Sundry Lines Are Firm and Advancing

Oakum remains firm at the prices quoted in last report. Plumbers' spun oakum is quoted at 8c lb. Other grades are quoted as follows: U. S. navy (English), 15c; new hemp (English), 15c; U. S. navy (American), 18½c; best (American), 19¼c.

Range boilers, 30 gallons, are quoted at $8.75. All products made from galvanized steel sheets are decidedly firm and will undoubtedly advance further in price before spring.

Linseed oil is firm 10 to 15c per gallon higher than it was two weeks ago, when the last report was written. Quotations now range from $1.10 to $1.15 per single barrel for ray linseed oil and 3c per gallon higher for boiled. The usual quantity reductions are allowed on larger purchases.

All kinds of wire has advanced 15c per 100 lbs.

Wire nails have advanced 15c per 100 lbs. and are now quoted at $3.95 base, with the regular standard advances for all smaller than base sizes.

The Great Advance.
—Knott, in the Dallas News.

There is a fair demand for putty and quotations are as follows:—Standard 100 lb. drums, $3.00; 25 lb. drum, $3.10 per 100 lbs.; Pure, 100 lb. drums, $3.70 per 100 lbs.; 25 lbs., $3.80 per 100 lbs.

White and red lead remain firm at exceedingly high prices.

Stove pipes and elbows are moving freely. Light pattern elbows are quoted, 6 in., $1.33 doz.; 7 in., $1.50 doz.

Stove pipes are quoted per 100 lengths as follows:—

Common, 3 in., $8.72; 4 in., $10.19; 5 in., $10.19; 6 in. $10.19; 7 in., $11.28. Bright, 3 in., $10.19; 4 in., $12.37; 5 in., $12.75; 6 in., $12.75; 7 in., $13.46.

Stove pipe wire has advanced 15c per 100 lbs., and is quoted as follows:—No. 18, $5.75 per 100 lbs.; No. 19, $6.25 per 100 lbs.; small lots, 7c to 7&c lb.

Candlewick packing has advanced further, and is now quoted at 35 cents lb.

Bolts remain firm at the discounts given in last issue. The market is very firm and further advances would not come unexpected.

Galvanized Sheets Firm and Going Higher

Galvanized sheets and all products made therefrom are very firm with every prospect of further advances in the near future. Labor in the mill districts is not only scarce, but a large part of it is now inefficient, due to their having imported a large number of blacks from the south, and these same colored gentlemen have proven in a large number of cases to be averse to labor.

Coal, which is generally purchased at $1.05 to $1.15 per net ton, run of mine, delivered at the steel plant, is now $3.75 to $4.50. Coke, which sold a year ago at Connelsville, is now $6.25; sheet bars selling as late as a year ago at $23 per ton, are now almost impossible to buy at $45 to $50. Spelter, which was down to 8c, is now $10.25 in hundred ton lots East St. Louis. Black sheets have advanced $10 per ton in the last 30 days, and it is freely predicted in the mill districts that galvanized sheets, carload lots, will be selling next spring for $7 base No. 28, U. S. gauge at Pittsburgh, which will be equal to $8.10, Hamilton or Toronto. One authority predicts that the prices which the trade will have to pay next spring will make present prices seem trifling by comparison.

Improved Demand for Copper

After a short period of quietness, there has been a revival of the demand for copper and the market is strong. Owing to the possibility of higher prices for copper, consumers are coming into the market, and are covering for their requirements over the second quarter of 1917. Local quotations are nominal and unchanged at 30-31c per lb.

Tin Firm but Quiet

The market is firm but quiet and unchanged. A little more interest is being taken in tin, but business is still very quiet. Local quotations firm at 47c per pound.

Better Demand for Spelter

There is a better demand for spelter, including a number of inquiries from galvanizing interests. The market is firmer, but unchanged. Spelter is firm at 12c per pound.

Lead Still at High Level

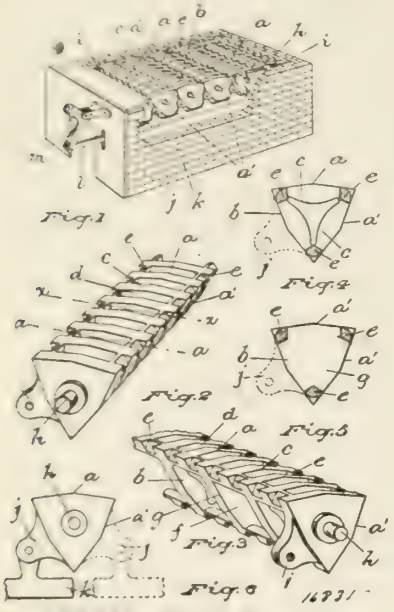
The leading interest is still quoting 7c New York, while independents are pretty close to that figure. The market is dull but firm, and business is quiet, consumers being well covered for the time being. Reports from New York state that Canadian consumers have purchased

(Continued on page 30.)

New Canadian Patents

James Joseph Hickey, Toronto, Ontario, Canada, 21st March, 1916; 6 years. Filed 15th September, 1915. Receipt No. 255,980.

Claim.—1. In a boiler grate, grate bars formed with two fire faces, the said fire faces formed by arched transverse ribs and air spaces, a series of ash pockets formed internally with said bars and in communication with the said air spaces, said bars adapted to be actuated to bring each of the fire faces into alternate use, substantially as described.



No. 168,342. Grate for Boiler.

2. In a boiler grate, grate bars formed with two fire faces, the said fire faces comprising a series of arched transversely spaced ribs by web sections integrally formed therewith, a series of internal ash pockets formed with said fire faces and in communication therewith, and means for actuating said bars for the alternate use of the said fire faces, substantially as described.

3. In a boiler grate, grate bars formed with three sides and two ends, a series of internal ash pockets and air spaces formed therewith, two of said sides comprising fire faces, the said fire faces formed with a series of arched transverse ribs, said ribs spaced apart, open sections in the other of said sides, said openings adapted to communicate with the said ash pockets and air spaces, said bars adapted to be pivoted in longitudinal relation and to be actuated to bring the said fire faces into alternate use, substantially as described.

4. In a boiler grate, grate bars formed with three sides in longitudinal relation and joined at the edges, ends formed therewith and having pintles formed thereon, internal ash pockets and air spaces formed by the three sides, two of the said sides formed with a series of arched transverse ribs spaced apart, the other of said sides formed with a series of open sections, said sections communicating with the interior of the bar, means for actuating the said bar to position two of the fire faces into alternate use, substantially as described.

5. In a boiler grate, grate bars formed with three sides in longitudinal relation, ends formed with the said sides, pintles formed on the said ends, air and ash spaces formed internally by the sides and ends, two of the said sides formed with regularly spaced transverse arched ribs, the other of said sides formed with openings at regular intervals, said openings communicating with the air and ash spaces, the said bars adapted to be pivotally supported by the said pintles formed on the ends thereof, and means for actuating the said bars to position two of the sides alternately, substantially as described.

6. In a boiler grate, grate bars formed with three elongated sides, internal air and ash spaces formed by the three sides, the internal air and ash spaces being divided into sections by solid walls, said walls corresponding in shape with the cross section through the bar, two of the said side faces adapted for fuel supporting, said two side faces formed with a series of arched transverse regularly spaced ribs, the other of said side faces formed with open sections, said open sections communicating with the internal air and ash spaces, means for adjusting the said bars to position the two fuel supporting faces into alternate use, substantially as described.

No. 169,805.

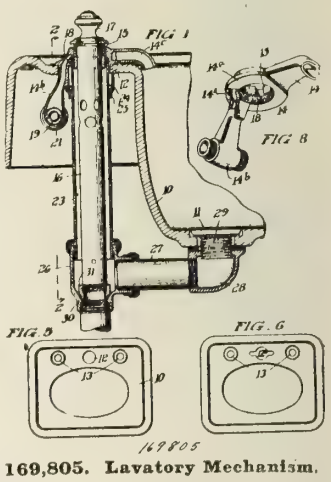
The Speakman Supply and Pipe Company, assignee of Willard Allen Speakman, both of Wilmington, Delaware, U.S.A., 30th May, 1916; 6 years. Filed 19th April, 1916. Receipt No. 264,511.

[Note.—This patent is a re-issue of No. 153,565, dated 10th February, 1914.]

Claim. 1. The combination with a lavatory basin having a plurality of vertical holes through the top of a combination nozzle fixture therefor including hot and cold water cocks secured in certain of said holes, the combination nozzle comprising an annular head located above the upper surface of the basin and formed with an internal water space, a waste pipe connected to said head and extending downwardly therefrom through the remaining basin hole, a waste valve in said pipe, connections between the bottom of the basin and said pipe, a receiving T connected at its foot to said internal water space and extending downward through said remaining basin hole alongside of said waste pipe, the portion of said T adjacent said head being in close proximity to said waste pipe and shaped to permit said pipe and T to both pass through the same round basin hole, but little larger in diameter than would be required to receive the waste pipe alone, and means to deliver hot and cold water through said cocks into said receiving T.

2. As an article of manufacture, a combination nozzle of the character set forth comprising a hollow annular head providing a circular passageway for hot or cold water, a receiving T connected to and communicating with one portion of said head passageway, and a delivery spout communicating with and extending from another portion of said head.

3. The herein described lavatory fixture comprising a combination nozzle including a hollow annular head having an internal thread, a receiving T communicating with the rear portion of said head, and a delivery spout extending from the front portion of the head, means to secure the nozzle to a standard basin, said securing means including a main waste pipe having engagement in said head thread, locking devices cooperating with said waste pipe, and means to deliver hot and cold water to and through said receiving T, substantially as set forth.



169,805. Lavatory Mechanism.

4. The combination with a lavatory basin having a plurality of vertical holes

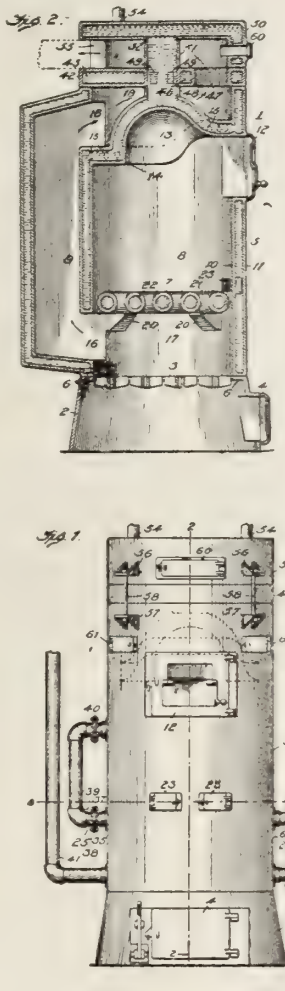
through the top, of a combination nozzle fixture therefor including hot and cold water cocks secured in certain of said holes, the combination nozzle comprising an annular head located above the upper surface of the basin and formed with an internal water space, a waste pipe connected to said head and extending downwardly therefrom through the remaining basin hole, a waste valve in said pipe, connections between the bottom of the basin and said pipe, a receiving T connected at its foot to said head and having its interior communicating with said internal water space and extending downwardly through said remaining basin hole alongside of said waste pipe, the portion of said T adjacent said head being in close proximity to said waste pipe and shaped to permit said pipe and T to both pass through the same round basin hole, but little larger in diameter than would be required to receive the water pipe alone, means for securing said head to said basin comprising a nut threaded on said waste pipe, and a washer interposed between said nut and basin and cut away to clear said receiving T, and means to deliver hot and cold water through said cocks into the receiving T.

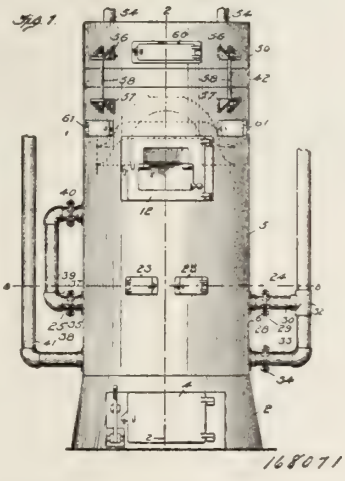
5. The herein described lavatory fixture comprising a combination nozzle including an annular head having an interal water space, a receiving T having its foot connected to the under side of said head and its interior in communication with said water space, a delivery spout projecting from said head and communicating with the water space therein, and a waste pipe connected to said head and adapted to receive a tubular waste valve having an operating portion surrounded by said annular head, said receiving T comprising a flattened stem portion adjacent said annular head in close proximity to said waste pipe, and a head portion more remote from said waste pipe.

6. The herein described lavatory fixture comprising a combination nozzle including an annular head having an interal water space, a receiving T having its foot connected to the under side of said head and its interior in communication with said water space, a delivery spout projecting from said head and communicating with the water space therein, a waste pipe connected to said head and adapted to receive a tubular waste valve having an operating portion surrounded by said annular head, said receiving T comprising a flattened stem portion adjacent said annular head in close proximity to said waste pipe, and an offset head portion more remote from said waste pipe, and means for securing said nozzle in place on a standard three-hole basin, with the waste pipe and T passing through the central hole of the basin comprising a nut threaded on said waste pipe, and a washer surrounding the waste pipe and adapted to extend between said nut and the under side of the basin slab and cut away to clear the portion of said T in closest proximity to said waste pipe.

Henry Tielkmeyer, St. Louis, Missouri, U.S.A., 7th March, 1916; 6 years. Filed 22nd November, 1915. Receipt No. 258,260.

Claim.—1. A boiler of the class described, consisting of a plurality of horizontally arranged superimposed hollow water sections through which a heating medium circulates, the said hollow water sections including a major section, a hollow disc section mounted upon and communicating with the major section and





168,071. Hot Water Boiler.

a top or cap section communicating with the hollow disc section, a hollow water grate communicating with the aforesaid major section, a vertical flue extending from beneath the water grate to the top of the major section, an adjacent flue horizontally disposed between the major section and the hollow disc section and communicating with the vertical flue, and another flue horizontally disposed between the hollow disc section and the cap section and extending from the aforesaid adjacent flue to the outside of the boiler.

2. A boiler of the class described, consisting of a plurality of horizontally arranged superimposed hollow water sections through which a heating medium circulates, the said hollow water sections including a major water section having a hollow dome-shaped section near the top thereof, a hollow water grate communicating with the aforesaid major water section, a vertical flue extending from beneath the water grate to the top of the major section, another flue disposed between the top of the major and the adjoining section and around the dome-shaped section of the said major section and communicating with the vertical flue and the top of the boiler.

3. A boiler of the class described, consisting of a plurality of horizontally arranged superimposed hollow water sections through which a heating medium circulates, the said hollow water sections including a major water section having a hollow dome-shaped water section located adjacent to the fuel door and communicating with the adjoining section at the centre thereof, a hollow water grate communicating with the aforesaid major water section, a vertical flue extending from beneath the water grate to the top of the major section, another flue disposed between the top of the major and the adjoining section and around the dome-shaped water section and the centrally located water connection with the adjoining section, and communicating with the vertical flue and the top of the boiler.

4. A boiler of the class described, consisting of a plurality of horizontally arranged superimposed water section through which a heating medium circulates, the said hollow water sections including a major water section, a hollow disc water section positioned upon the major section and communicating therewith, the said hollow disc section being provided with a series of openings, a fuel grate positioned in the said major section, a vertical flue extending from beneath the grate to the top of the major section, another flue disposed horizontally between the said major section and the hollow disc section and communicating with the vertical flue and the openings in the hollow disc water section and another flue extending from the aforesaid openings to the outside of the boiler.

5. A boiler of the class described, consisting of a plurality of horizontally arranged superimposed hollow water sections through which a heating medium circulates, the said hollow water sections including a major water section, a hollow disc water section mounted upon the said major section and communicating therewith, a hollow cap or top water section mounted upon the said hollow disc water section and having communication therewith by means of a central conduit, a

(Continued on page 30)

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HUMIDITY A NECESSITY

ON another page the first of a series of articles appears on the question of humidity in our buildings, the need of it and why. Our readers will find in this series some very interesting reading. We have not somehow given the importance to this question that we, as sanitary engineers, should. We have installed all manner of heating systems which have dried the very moisture out of the air, which was and is so very essential—just as essential as fresh air. Of course we are well aware that in some localities where there is a hot sun and lots of snow, nature furnishes us with a certain amount of humidity, but our homes are closed up for the greater part of the winter, and therefore it comes within the scope of the sanitary and heating engineer to devise and install such appliances, be they ever so crude, as will furnish a good supply of moisture to the buildings we live in or work in. These articles which are to be well illustrated will show how many buildings are being furnished with moisture particularly residences. In large buildings where there are air washers indirect heating, etc., the question of air moistening is not so difficult, though none the less important.

BE A MERCHANT

IN the last issue of THE SANITARY ENGINEER there appeared an article entitled "Problems for Boards of Health." Those who have not read it should do so by all means. It opens up a subject never before broached in that way and one which if ever dealt with in the manner suggested, would be a boon to all concerned.

Speaking the other day to a hardware man who had read the article and who also has a large plumbing establishment, he remarked that the fault lay with the sanitary engineer.

Here was his story:— said he "When I started this hardware store some years ago I had customers come in and ask me for bits of pipe, pipe fittings, sometimes to make up a fence, sometimes to fit a range boiler to the stove, or else a tap washer, I simply had to carry a small stock of such goods.

"There was in those days only one plumber in this district and he had just a workshop and did a little new work. But as time went on more buildings began to go up (this locality was at that time very sparsely built on) and finally my present partner, who is a plumber, came in to see me and asked if I had any work on, etc., thinking I had a plumbing shop on account of seeing a few lengths of pipe on the sidewalk.

"He gave me the idea that I could likely open a branch, especially as my store was then a little too big for me. First of all he advised me to fit up a show room and put in a good window now and again. I did, and here we are now. The plumbing and heating department is now turning over more goods than the hardware department. I believe the reason why we have such a lot of junk on the market, some sold by hardware stores who do not install the goods as well as mail order houses, is because sanitary and heating engineers are poor business men. They are not as a rule merchants, but splendid mechanics.

"I myself would never have opened a plumbing branch if Mr. So-and-So had opened a good store on the front street, and he is still in his back shop, with only 3 or 4 men on when things are busy."

There is no doubt much food for thought in the above remarks. It is no doubt too bad to see the number of plumbers, sanitary and heating engineers who are never any bigger than a back shop establishment. No doubt the very fact of there being such a number gives rise to the statement that they are "Only good mechanics."

There is no reason in the world to believe that if sanitary and heating engineers had catered to the public as merchants, selling and displaying the wares they install, that the public would have gone to hardware and general stores for supplies. Further, if sanitary engineers had and were to begin selling all manner of plumbing fixtures as a rule, not as an exception, no hardware store would attempt to break in.

There is ample proof of the above assertion, in the fact that where there exists a live up-to-date sanitary and heating engineer, one who is also a live merchant, it is very seldom the local hardware men break in on the plumbing supply business. But the hardwareman is to be congratulated, where he has opened a plumbing branch. Let us therefore see more men in the business on the merchandising end. Such would very likely tend to make better businessmen of those now engaged in the trade simply as mechanics.

EDITORIAL BRIEFS

BE A merchant, let goods sold pay some of your overhead.

* * *

MOST businessmen sell goods and give service.

* * *

SANITARY engineers sell service at a low price and give the goods away. Some do.

Humidity and Its Importance

1. Physical Properties of Air and Moisture (Humidity)—II. Instruments for Measuring Humidity—III. The Effect of Humidity on Health and Comfort—IV. Apparatus for Artificially Increasing Humidity in the Air.

By Consulting Sanitary Engineer.

1. Physical Properties of Air and Moisture (Humidity).

THE branch of science that deals with the properties of air and moisture in their relation to climate and weather is known as Meteorology (literally, the science of things in the air).

Due to exposure to sun and wind, water evaporates from the earth's surface—from the oceans, rivers and lakes and to a less extent from the soil—at any temperature. Even ice and snow are evaporated, though slowly, in the coldest weather without being liquefied or changed into water.

The atmosphere therefore always contains more or less vapor of water or moisture. This eventually returns to the earth in some form. And the evaporation from the earth's surface in a year equals the total fall of rain, snow, dew, etc.

Under ordinary atmospheric pressure at sea level, water can exist at a temperature above 212° Fahr., only as steam or water vapor (which is exactly the same thing), but steam can exist at any temperature. However, the cooler the air the smaller the amount of water vapor it can hold. This is explained by the fact that air like all other gases expands with heat and contracts when heat is withdrawn. If heated from 0° to 70° Fahr., air increases about 1-7 in volume. Air consequently has a greater capacity for moisture at high than at low temperature.

If air which contains all the moisture it is capable of holding (in which case it is said to be saturated), is further cooled some of the water vapor will be condensed and deposited as drops of water. At night grass and plants quickly radiate the heat they got from the sun during the day; the air in contact with them becomes cooled, cannot hold as much vapor as before and deposits some in the form of dew. The dew-point is defined as the temperature to which air must be cooled so that it will be so completely saturated with moisture that the vapor will begin to condense into water. The dew-point evidently depends on, and varies with, the temperature of the air and the amount of moisture present at any time.

Table 1 shows the exact weight of moisture that a cubic foot of saturated air at ordinary atmospheric pressure at sea level can hold. The amount is comparatively small and is given in grains (7000 grains equals 1 pound). It will be noted that saturated air outside a house in winter at 20° below zero would contain only 0.22 grains per cubic foot while to saturate a cubic foot of air inside the house at a temperature of 70° Fah. would require 7.98 grains.

TABLE I.

Temperature of Air Degrees Fahrenheit	Grains of Water Vapor per Cubic Ft. of Saturated Air	Temperature of Air Degrees Fahrenheit	Grains of Water Vapor per Cubic Ft. of Saturated Air
			5.74
20	0.22	60	6.78
10	0.35	65	7.98
0	0.56	70	9.36
20	0.87	75	10.93
30	1.32	80	12.74
40	1.96	85	14.79
45	2.85	90	17.12
50	3.41	95	19.77
	4.08	100	

Humidity meaning dampness or moisture is generally defined as the amount of water vapor in the air.

Absolute Humidity is the number of grains of moisture in each cubic foot of air.

Relative Humidity is the ratio of the quantity of moisture present to the amount that air could hold if it were saturated. It is expressed as a percentage. Whatever the temperature of the air, it has been found that for comfort the Relative Humidity should remain nearly constant (from 50 to 60 per cent.). This means that there must be a considerable change in Absolute Humidity or in the actual amount of moisture present for each change of temperature. This fact has an important bearing on heating and ventilating problems.

11. Instruments for Measuring Humidity

The methods and instruments used for different humidity measurements may be described as follows:—

Hygrometer.—An instrument for ascertaining the humidity or the state of the atmosphere as to moisture. There are three common types, the Condensing or Dew-Point Hygrometer, the Chemical Hygrometer and the Wet Bulb Thermometer or Psychrometer.

The Condensing Hygrometer. In this instrument the thing directly observed is the dew-point or the temperature at which the atmospheric moisture begins to condense. Of condensing hygrometers Bache's and Daniell's may be mentioned. The latter is a more convenient instrument but requires for very dry air, considerable dexterity in manipulation.

The Chemical Hygrometer. The actual amount of moisture in a given bulk of air is chemically absorbel and weighed, thus giving the absolute humidity or number of grains of water vapor per cubic foot of air. While accurate this method is evidently not adapted this ordinary use.

The Psychrometer. This instrument on account of its convenience is now very generally used. It consists of

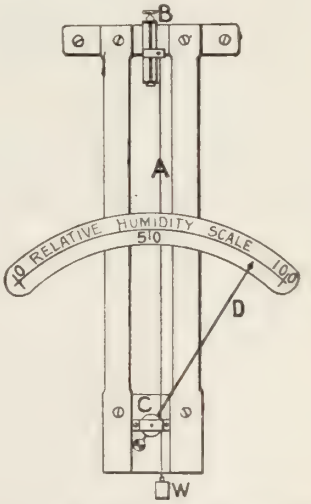


FIG I.—A HAIR HYGROMETER

a dry bulb and a wet bulb thermometer placed side by side, the latter having its bulb tightly wrapped or covered with wicking or muslin, the end of which (see Fig. 3) is immersed in a cup or tube of clean, distilled or cistern water. The water is drawn up into the wickings or muslin due to capillary attraction and evaporates into the sur-

rounding air. This evaporation of water extracts heat from the bulb of the "wet" thermometer and causes it to read a temperature below the actual temperature of the surrounding air. The drier the air the more rapid the evaporation and the greater will be the difference between the wet bulb temperature and the dry bulb temperature.

In order to have the instrument read correctly a rapid current of air should be passed over the wet bulb to remove vapor as soon as it is formed. Psychrometers are therefore frequently made so that they can be whirled in the air in which case they are called Sling Psychrometers.

In none of these hygrometers just described is the Relative Humidity (necessary to be known for heating and ventilating purposes) directly found. But knowing the temperature of the air, then

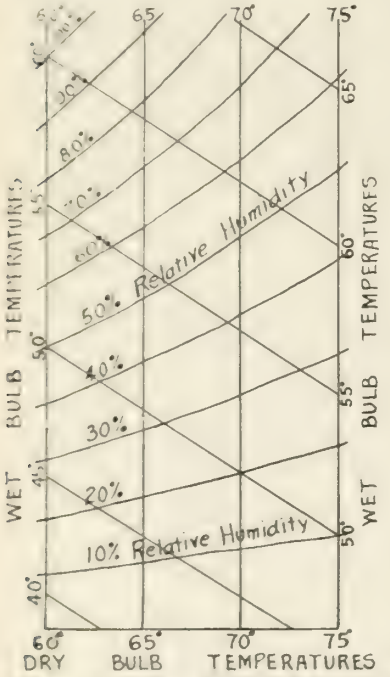


FIG 2 — WET AND DRY BULB CHART

the dew-point, the absolute humidity or the reading of the wet bulb thermometer gives information from which the relative humidity may be counted or obtained from tables or charts.

To the ordinary Pyschrometer has been added various movable scales or other devices from which the relative humidity can be quickly found. They are then known as "Hygro-Autometers," "Hygrophants", etc. The most convenient of this kind is the "Hygrodeik" shown in Fig. 3. The humidity may be read directly from the chart (located between the thermometers) by means of the dial.

For the ordinary wet and dry bulb thermometers, charts have been prepared which give not only the relative humidity but also the dew-point and the absolute humidity. In Fig. 2 is shown a portion of such a chart from which for ordinary house temperatures the relative humidity may be found for wet and dry bulb thermometers. Take for example a reading of 70° on the dry bulb thermometer and at the same time 50° on the wet bulb thermometer. On the chart follow the 70° dry bulb temperature line up until the line intersects the 50° wet bulb temperature line. It will be found that the 20 per cent. humidity line in this case also intersects at the same point. This means that for the wet and dry temperatures given the relative humidity is 20 per cent.

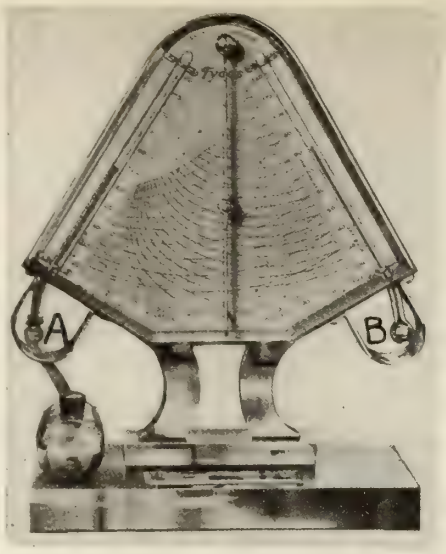


FIG. 3.

The Hygroscope is an instrument or device for indicating directly, without computation or charts, the approximate relative humidity of the air. Many, and in fact nearly all, organic substances are affected by moisture which generally increases their dimensions, as wool, hair, whalebone, whipcord, catgut, grass, etc. A thin shaving of whalebone, or a hair is very sensitive and a human hair may vary to the amount of 1-50 of its length by simple change of moisture. Some chemicals have the property of changing color when the amount of moisture in the air changes and "popular" hygroscopes depend on this principle.

A hygroscope made of hair, although really not a hygrometer at all, is known as a hair hygrometer. A good hair hygrometer properly looked after will give readings that should vary not more than 5 per cent. from standard readings. This is of course not accurate enough for scientific purposes. It is, however, probably sufficiently accurate in many cases for determining the relative humidity of buildings for heating and ventilating purposes and has as mentioned, the advantage of direct readings.

A Hair Hygrometer is illustrated in Fig. 1. It consists essentially of a hair (A) from which the oil has been removed fastened by an adjustable mechanism (B) to a suitable frame. The lower part of the hair from which a weight (W) is suspended is wound on a cylinder (C) which is free to revolve and which carries a balanced pointer (D). The hair increases (sending pointer to the right) or diminishes (sending pointer to the left) in length in proportion to the amount of moisture in the air. The 0 and 100 on the scale are the points of extreme dryness and of saturation, respectively. They can be determined by chemical means or the scale can be graduated by comparison with determinations made with a wet and dry bulb thermometer. The relative humidity is then read directly from the scale being expressed as a percentage.

(Continued in Next Issue)

EXCESSIVE WATER CONSUMPTION

Discussing the consumption of water, a writer in *Conservation* says:—

The excessive water consumption in Canadian cities constitutes a very serious problem. The average daily consumption in the Dominion is 111 gallons per capita; in individual provinces it reaches as high as 143 gallons per capita, and in certain centres of fairly large size attains a maximum of 292 gallons. There is no doubt that these figures can easily be lowered. The consumption in Great Britain is below 25 gallons in several cases, and the highest rate is 70 gallons per capita.

That the more extensive use of meters would remedy conditions to a great extent is shown by two of our Prairie Provinces, Manitoba and Saskatchewan, where meters are more widely used than elsewhere and where the average consumption falls to 50 gallons and 55 gallons, respectively — less than half the average for the remaining provinces. Nor would the introduction of meters mean an increased cost to consumers. The average estimated cost of water for Canada is 10.9 cents per 1,000 gallons, the only provinces materially exceeding this being the two Prairie Provinces, where meter rates have already been widely adopted. The rates charged on the meter basis could be adjusted to meet different local conditions, so that the amount paid by each consumer would be practically the same as at present, but all wastes would be avoided. Many Canadian municipalities have both flat and meter rates in force, the consumer having the choice between the two, but as a rule the meter rates are so ridiculously high for the average consumer that there is in reality no choice. For instance, although the estimated cost for Canada is 10.9 cents per 1,000 gallons, numerous cities and towns charge 30 cents and over, with several charging even over $1 per 1,000 gallons.

Farmers Want City Conveniences

IN our issue of September 15 an article appeared under the above heading, tending to show that the farmers and rural residents were in great need of sanitary plumbing in their homes. The article was based upon a report published some time ago by the Commission of Conservation.

We would ask our readers to refer to the reading matter which appears in a panel on page 33, and which is an actual reprint, word for word, from the report mentioned.

Now, we cannot see where the report warrants the writing of such an article as recently appeared in Toronto *Saturday Night*.

The article in question reads as follows:

SAYS FARMERS ARE "A DIRTY LOT."

"According to the observations of the Commission of Conservation our farmers must be a dirty lot. With a view to solving the very serious problem of making the farm more attractive, thereby retaining the young people in place of having them transfer their energies to the centres of population, the Commission of Conservation has made an extended survey of conditions on the farm. For this purpose they took observations on four hundred Canadian farms of the better class —farms which averaged 125 *acres. Of the total four hundred, only eight had bathrooms. Sixteen in every hundred had water piped into the houses, while seventeen per cent. had furnaces of one sort or another. The Commission further ascertained that there were two motor cars for every bathroom among these four hundred homes. Imagine the drudgery of housework, not to speak of general cleanliness, in homes where bathtubs, kitchen sinks and ordinary sanitary conveniences are unknown. And this among people who from the financial standpoint are far better able to afford such things than is the average resident of a city."*

To the above item some exception is taken by *The Forest Free Press*, and to some extent, rightly so, as follows:—

"The above complimentary reference to 'our farmers' is taken from the editorial columns of the last number of Toronto *Saturday Night*, an excellent weekly journal, which discusses matters in a plain-spoken manner. If 'our farmers' were not taxed to the limit to maintain an unwieldy Commission of Conservation and a score of other commissions they could afford more of the requirements of life which they must now forego. If by 'the average resident of a city' is meant those residents who are engaged in any kind of business we beg to remind the writer of the above paragraph that those city residents can afford many luxuries denied 'our farmers' simply because of the special privileges extended them by a one-sided fiscal policy which exempts them from many items of taxation which are imposed on 'our farmers.' For example, *Saturday Night* enjoys exemption from tariff taxation and war tax on all its presses and type-setting machines. When 'our farmers' get a square deal in matters of taxation they will be able to afford more bathrooms. But while they have to pay all their own taxes and a large portion of the taxes of 'the average city residents,' they will have to bear the stigma of being called 'a dirty lot.' Probably some day 'our farmers' will arise in their might and equalize matters."

In the opinion of THE SANITARY ENGINEER, however, neither of our contemporaries is on the right track. What is the trouble then?

Simply that farmers have never been approached in an intelligent manner; the press, such as are here mentioned, have neither of them shown how conditions can be improved. Why? Simply because they both receive more advertising from automobile manufacturers than from manufacturers of plumbing goods; that plumbing and plumbers, or as they are now known, "Sanitary Engineers," have always been looked upon as "undesirables," even though it is solely due to these "undesirables" that it is now possible to live in city and country houses, and be healthy.

It would be interesting to know how much space *The Forest Free Press* would devote to reading matter that would show the farmer how a septic tank can be built, and why it should be built in such and such a way, or even explain how a pneumatic system should be installed, etc., as well as what the cost of a well-equipped kitchen and bathroom would be. The writer has frequently offered to write articles of this nature free to many newspapers, and has offered to furnish drawings, etc., only to be politely told that "It costs too much to set the type up," or, "Oh, yes, you're trying to boost up business for the plumbers."

Of course, the writer would not deny that he has an eye on creating more work for the sanitary and heating engineers, but who will reap the greatest benefit? The farmers, their children, and their wives. Yea, and to a far greater extent than the profit made by the person installing such goods.

The writer ventures to say that value for money, our craft installs far more worth in material and labor when a house is equipped with modern sanitary appliances than when an automobile is sold.

And look at the service. Not a mere few hours' enjoyment or even service per week, but actual comfort on tap 24 hours a day.

We do not blame the farmer and to some extent we do not blame the press, but we do believe that if sanitary and heating engineers were as good salesmen as newspaper men, or the vendors of automobiles, that not only would there be more automobiles sold, more newspapers read, but there would be greater efficiency on the farm. We do not think that farmers "are a dirty lot" by any means, but we do know that once a farmer is shown that he can enjoy all the conveniences of a city home and shown by both the conservation commission, the press, and the plumbers, the farmers will not be backward in having such conveniences installed.

Don't blame the rural resident or farmer for a duty neglected by others. Readers, it is up to us, and there's better business to be had from the farmer as well as better service rendered by us.

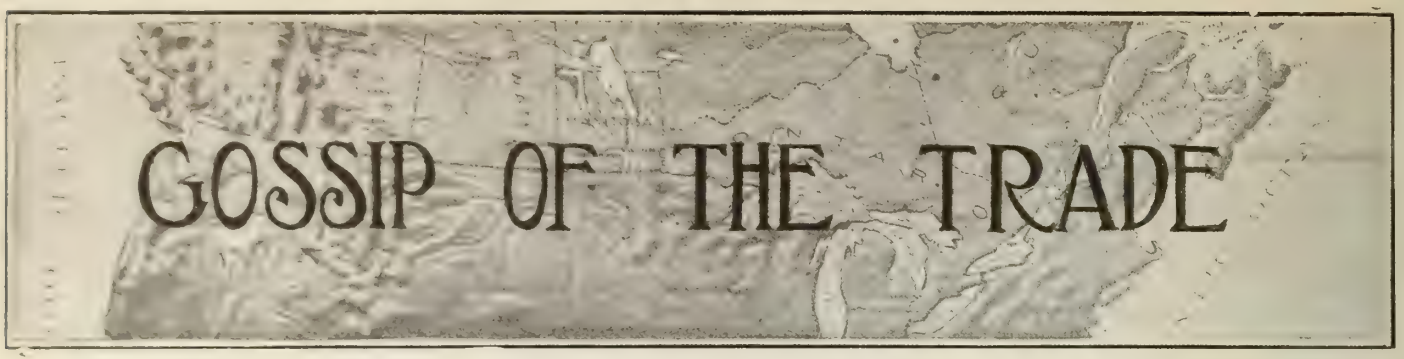
(Continued in next issue).

SELL YOURSELF

Don't think that because you are not selling goods you do not need salesmanship. No man can be successful who is not a good salesman. If you are not selling goods you are selling brains and ability. Every time a man tries to get a new position he is selling himself—every time a man tries to get a loan at the bank he is selling himself—every time a sanitary and heating engineer secures a contract he is selling himself plus material. If the price is too low and he has lost money on the contract, he has really "sold" himself and given a portion of the material away. The latter he pays for in cash, himself in bitter experience.

Price cutting is just like a $10,000 a year man working for a dollar and a half a day, and everyone would think such a man a fool.

That's one of the reasons why we in our trade are frequently looked upon as extortionate. We don't know how to sell ourselves.



VISITS BOSTON AND MOTORS

T. B. Smyth, Toronto, past vice-president of the Toronto Society of Domestic Sanitary and Heating Engineers, visited Boston recently. After doing all the sights in that city, as well as giving his good lady, who accompanied him, a good time, he indulged still a little further by investing in a new "buzz wagon," motoring back from Boston to Toronto in it. Space will not permit a description of the beautiful scenery en route, suffice it to say that our good friends had a first-rate time and are none the worse for their journey.

JOE BELL SPORTS A CAR

Friends of Joe Bell, the worthy representative of Warden King Co., Ltd., manufacturers of boilers and radiators, now sports a car. He declares he will not patronize the Toronto Railway Co. any more than he can help, neither will he impose on "shank's mare" unduly. Let's all hope that Joe's investment may prove a great benefit to him, both when on business and on pleasure bent.

KILLED AT THE FRONT

The Sanitary Engineer wishes to join the friends of Walter Boddington, Toronto, in extending to the parents heartfelt sympathy on the loss of their son Walter, who went overseas with the First Canadian Contingent and fell in the fight doing his duty for freedom and [illegible].

SPEAKMAN COMPANY APPOINTS NEW MANAGER.

The Speakman Supply & Pipe Company, with home office and factory at Wilmington, Delaware, have just announced the appointment of Mr. L. J. MacMahon as their New York representative.

Mr. MacMahon should be well known to the plumbing trade, as he has been associated with and represented some of the country's best known lines in plumbing equipment. For nearly two years he was connected with the Sanitary Department of the Brunswick-Balke-Collender Company, and sold and promoted the White-Bone-Ite Toilet Seat, and was instrumental in getting this specialty adopted by the U.S. Government, by several municipalities and some of the country's leading railroads.

Following this connection, he represented the Federal-Huber Company in New York, and is now leaving the Richmond Radiator Company to take up his new duties as Speakman's representative in Gotham.

CONSULTING ENGINEERS REORGANIZE

The engineering work at the Whitby Hospital for the Insane which was designed by MacMullen, Riley & Durley, Consulting Engineers, will be carried to completion by the firm of MacMullen, Riley & Angus who have taken over the unfinished work of the former firm.

Mr. Angus whose name appears in the new organization is well-known in engineering circles in Toronto and has been for some years practising his profession in this city. The new firm will continue the design of heating, ventilating, plumbing, electrical equipment of buildings as carried on by them separately in the past and will also specialize in the building design and equipment of industrial plants.

ONTARIO AGRICULTURAL COLLEGE

Department of Physics, O.A.C.
Guelph, October 17th, 1916.

The MacLean Publishing Co.,
Toronto,
Ontario.
Gentlemen:—

Enclosed find $1 in payment of subscription to the "SANITARY ENGINEER," from September 30th, 1916, to September 30th, 1917.

I have much pleasure in saying that each issue of your "Sanitary Engineer" gives me much interesting information.

Yours sincerely,
R. R. GRAHAM, B.A., B.S.A.
Lecturer in Physics.

THE DOMINION FITTER

Said a great writer: "Show me a man's library, his book shelf, or if in any particular line of business, show me the catalogues he keeps as well as other books of reference, and I will tell you the character of that man." When a manufacturer issues a high-grade reference book, well gotten up and well compiled, containing the very extracts of what his customers desire to know, that concern is filling a long-felt want. Further, when such a book is issued and its contents are based upon years of solid experience, that book and that concern are doing an admirable work. No sanitary and heating engineer can get along in his business and be progressive unless he procures all available data in as condensed a form as possible. Therefore, if interested in heating installations, our readers should write to the Dominion Radiator Co., Toronto, and procure the "Dominion Fitter," a book gotten up in wallet style, containing over 300 pages of real good stuff, a library on heating in itself.

OBITUARY

Pte. Percy G. Chapman, who served his time to the plumbing trade with J.A. McKenzie, Namayo Avenue, Edmonton, died of tonsilitis in France.

IMPROVING WATER SUPPLY

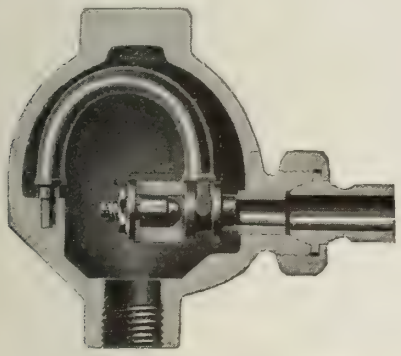
Workmen are employed in putting in the new filtration plant at Niagara on the Lake water works. The foundation, boiler, filters, etc., are all in place and it is expected that the new system will be ready for use in a few days.

When it is in use, the water will be 98 per cent. pure and will be the best obtainable anywhere in the country. The installation of the new system, including the new electrically driven pumps is costing about $15,000, of which $4,500 will be paid by the Government, as it has been put in at the urgent recommendatio of the Provincial Board of Health, principally for the sake of furnishing a supply of pure water free from germs, for the soldiers in training here.

STEAM HEATING LITERATURE

One of the finest collections of booklets, folders and bulletins to arrive for editorial reference recently, was that received from E. F. Houghton & Co., Philadelphia.

Bulletin T described in large views the Houghton American thermostat. Another book received is entitled "The American System of Heat Control" and is



HOUGHTON RADIATOR TRAP

certainly very interesting, containing quite a quantity of splendid matter of an educational nature.

A loose leaf bulletin folder entitled "The Houghton Steam Specialties" and containing a number of bulletins, was also received. These described steam circulation systems, steam traps, float traps, reducing valves and balanced valves.

The whole a heating library in themselves and well worth inquiring about.

VISITOR TO CANADA

The Speakman Supply & Pipe Co., Wilmington, Delaware, have made considerable additions and improvements to their plant and have had their Mr. Jos. H. Dallett calling upon the Canadian trade last week.

CHEER UP.

Do not look sad and doleful,
Or carry a face so long,
But keep your brow all sunny,
Your heart just full of song.

If mute is the earth in sorrow,
Why, pipe your own small blasts,
Your patch of Life will be beaming
If you whistle, till grief is past.

Don't be a grumpy tack head,
Unlock the sunshine door;
Good cheer is like a magnet,
One smile will welcome more.

Quit your whining wail so gloomy,
Put a twinkle in your eye,
Buck your grit and cease repining,
Be a man and stow that sigh.

Don't be stingy with your giggle,
Be one of the happy crew;
Smile when the skies are dreary,
Laugh when the rain pours through.

Scatter along Life's highway,
The fragrance of laughter and mirth;
A man with a smiling face
Is a winner all over God's earth.

—Eva E. Hamilton.

TRADE PAPERS IN BANKS

Bankers have their own trade journals, of course, but the business of banking touches every other line of commercial activity, and hence the bank can readily find matter of interest in publications covering the various trade and technical fields.

One of the biggest national banks of Chicago has found the trade journals of maximum interest and value, and those handling certain divisions of its business make a point of keeping themselves posted regarding conditions in those lines by a regular perusal of the trade journals covering them.

In this way the bank representative is not only kept informed about the peculiarities of the industries he is handling—thus being able to discuss the business of his depositors intelligently—but he becomes able to act with more judgment in matters involving the extension of credit and the placing of loans.

An executive of this institution said recently that the trade papers play an important part in the business of the bank.

"Our vice-presidents make a point of reading the journals which cover the lines of trade in which they are especially interested," he explained. "They become familiar through reading reports, with the movement of prices on various commodities, and they know what the general trend of trade is in these industries. It puts them closer in touch with the customers of the bank to have this knowledge and we regard the money spent for subscriptions to the various journals as wisely invested."

The trade papers are found on file in the leading libraries of the country, where they are constantly referred to for the sort of technical "inside" information which may be had nowhere else. This intensified interest in the editorial contents of trade jouurnals is the best explanation of the value of their space from the standpoint of advertising.—By courtesy of "Class."

MANUFACTURERS' AGENT

The friends of W. H. Cunningham (Bill) will be interested to know that he has severed his connection with the James Robertson Co., Toronto.

Mr. Cunningham has almost been looked upon as one of the Jas. Robertson's old standbys, and to some extent he has been one. His business dealings on behalf of the firm have always ap-

W. H. CUNNINGHAM

peared to have been courteous, obliging and fair in every respect.

Some 15 years ago he began with the firm as junior clerk. Step by step he has risen from that humble start to sales manager. With the exception of two years, Mr. Cunningham has served the Jas. Robertson Company all the time, covering Ontario as traveler during a part of that period. For the two years mentioned he represented the Ideal Mfg. Co., Detroit.

He has now taken up responsibilities on his own account, as a manufacturers' agent and will represent a number of manufacturers of plumbing and sanitary goods. For the present his address will be 98 Kingston Road, Toronto.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

HOW TO SOLDER ALUMINUM

Editor The Sanitary Engineer:—

Can you inform me how aluminum can be soldered. Where can I procure aluminum solder, if there is such a thing made?

H. E. L. ALLANDALE.

The following is the best way to solder aluminum:—

In using aluminum solder certain precautions are necessary to ensure good results. All grease, oil and dirt must be cleaned off the pieces to be soldered. The pieces must be "tinned" with the solder at the places which are to be joined. This in the case of sheet aluminum can be done by heating the sheet until the solder will run freely by rubbing. Whilst hot, the two pieces are brought together and joined, either by pressure or by the aid of a very hot soldering iron.

If the pieces are large and heavy they will require a considerable amount of heating, and this is best done by a blowpipe or blast-lamp, if possible, directing the flame away from the actual parts to be joined, so as to avoid oxidization. Rub well with the solder and bring the parts together and keep them well in contact till cold.

It is important that no flux whatever be used when soldering aluminum.—Editor.

This solder can be procured from the Canada Metal Co., Toronto.—Editor.

WHERE CAN CORRESPONDENCE COURSE BE PROCURED

Editor The Sanitary Engineer:—

Would you kindly inform us where a [illegible] correspondence course can be procured in sanitary plumbing construction. The writer is desirous of spending his winter evenings to some benefit.

[illegible] & Sons, M., Ontario.

Write Professor Arthur Bateman, American Correspondence School, Sanitary Engineering Department, Chicago. Professor Bateman has been recently appointed director of that institution and has a worldwide reputation both in teaching and practical experience.—Editor.

DATA RELATING TO HEATING SYSTEMS

(Continued from page 14)

the outside when the steam within the radiators condenses and creates a "self induced" partial vacuum. Usually these air relief valves are connected by a small size air line leading to a condenser radiator C (Fig. 11), located in a cool place and customarily used as an

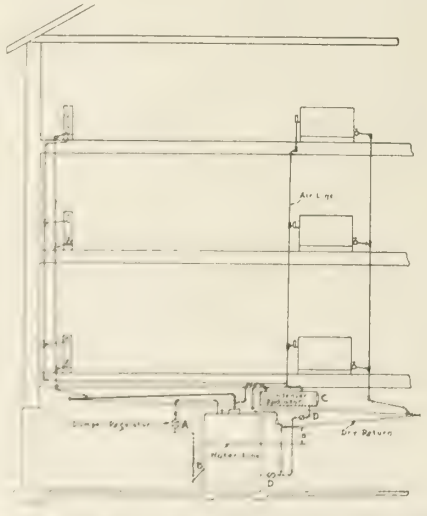


FIG. 11. SELF INDUCED VACUUM VAPOR SYSTEM.

indirect radiator. Sometimes the air lines are connected to one large air relief valve which is located in the basement. The condenser radiator C serves the purpose of aiding this self-induced vacuum, and when used as an indirect radiator probably aids in giving desirable results. A sensitive automatic draft damper controller A must be used to keep the steam pressure in the boiler as low and constant as possible . The use of a proper check valve, shown at D, is necessary to maintain a steady water line in the boiler.

On account of simplicity of action, the self-induced type of vacuum system (Fig. 11), or the type B mechanical system (Fig. 10), are more suited to a residence heating plant where the attention of an expert cannot be expected, than the type A mechanical vacuum system (Fig. 8). The latter system is no doubt better suited to the larger installations, such as office and large public buildings where it is desirable to maintain a medium pressure of steam for various purposes, and where it can be expected there will be available the services of an expert caretaker for the apparatus.

Continued in next issue.

THE BETTER THING

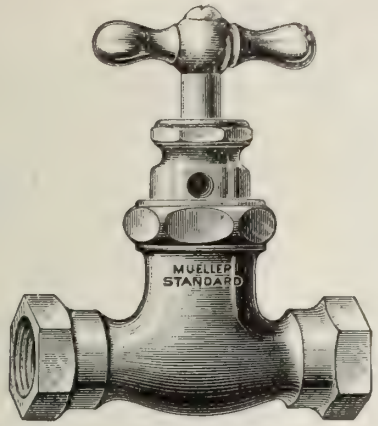
Edgar A. Guest

It is better to lose with a conscience clean
Than to win by a trick unfair;
It is better to fail and to know you've been,
Whatever the prize was, square,
Than to claim the joy of a far-off goal
And the cheers of the standers-by,
And to know down deep in your inmost soul
A cheat you must live and die.

Who wins by trick can take the prize,
And at first may think it sweet,
But many a day in the future lies
When he'll wish he had met defeat.
For the man who lost shall be glad at heart
And walk with his head up high,
While his conqueror knows he must play the part
Of a cheat and a living lie.

The prize seems fair when the fight is on,
But save it is truly won
You will hate the thing when the crowds are gone,
For it stands a false deed done.
And it's better you never should reach your goal
Than ever success to buy
At the price of knowing down in your soul
That your glory is all a lie.

You Couldn't Buy a Poor One for a Million Dollars



Mueller Compression Stop and Waste Cock

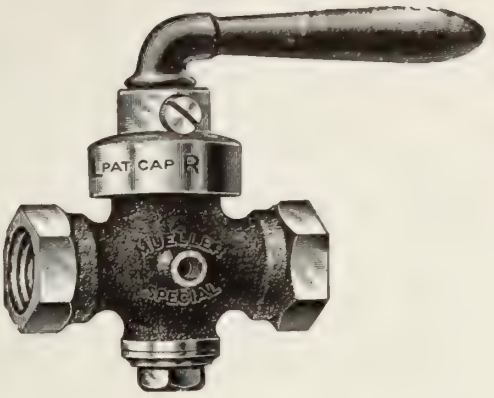
Made of high copper bearing Bronze—nothing but virgin metal used.

Encased seated washers of the highest grade.

Perfectly fitted threads throughout.

All parts interchangeable.

Pressure is not open to waste when being turned on or off.



Mueller Stop and Waste Cock

(GROUND KEY WORK)

Made for Iron, or Lead Pipe as well as Lead and Iron. Heavy Pattern with free, clear waterways. Smooth working.

FULLY GUARANTEED

IT is greatly to your interest to use only the very best in stop and waste cocks. Poor stop and waste cocks have cost more to the consumer, as well as the trade, than any other piece of brass goods used in the sanitary and heating business.

A stop and waste cock that fails to act in case of emergency may cause serious damage to your customer's home and your reputation.

MUELLER STOP AND WASTE COCKS are positively reliable. Whether they are operated often or once in months or years, they are ready to act efficiently.

Once operated may be worth several times the first cost.

Nearly 60 years' experience, supreme efforts to produce only the best in brass goods, and our unconditional guarantee stand behind these and all other Mueller lines.

Write for complete catalog.

H. Mueller Mfg. Company, Limited

SARNIA, ONTARIO

Makers of High-Grade Water, Plumbing and Gas Brass Goods.

PRACTICAL SHEET METAL WORK

(Continued from page 17.)

Bisect the lines AC and CB (method shown in Fig. 1) at E and F. Draw ED and FD at right angles to AC and CB respectively, and let these lines meet at D. D is the centre of a circle which will pass through A, C and B.

Fig. 6.—To Construct a Regular Hexagon With Sides of a Given Length

Let AB be a straight line, the length of which is that required for the sides of the hexagon. With A as centre and AB as radius, describe a circle. Produce BA to cut this circle at C. With BA as radius and B as centre, describe a circle cutting the first circle at F and E, and with C as centre and CA as radius, describe a circle cutting the first circle at G and D. Join CD, DE, EB, BF, FG, GC. The figure thus formed is a regular hexagon, whose sides are all equal to AB.

Fig. 7.—To Construct a Square on a Given Straight Line

Let AC be the given straight line. From A draw a line at right angles to AC, and with A as centre and AC as radius, describe a circle cutting this line at E. From C draw a line at right angles to AC, and with C as centre and CA as radius, describe a circle cutting this line at D. Join ED.

Then AEDC is the square required.

Fig. 8.—To Form an Octagon from a Given Square

Let ABCD be the given square. Join AD and CB and let them intersect at E. With A as centre and AE as radius, describe a circle cutting AC at F and AB at G, similarly from B D and C as centres, describe circles cutting the sides of the square at H and J, K and L, M and N. Join GL, JN, KF, MH. The figure MHGLJNKFM is the octagon required.

Fig. 9.—To Inscribe an Octagon in a Given Circle

Let AB be the radius of the given circle and CAB a diameter. Draw EAD another diameter at right angles to CAB. Bisect the four right angles at A by the diameters FAG, HAJ. Join the points GH HE EG GB, BJ JD DF FC. The figure thus formed is the octagon required.

Fig. 10.—To Find the Radius of Any Given Arc

Let AB be the given arc. Take any point C in it and with any radius less than CA or CB describe a circle cutting the arc at D and E. With the same radius and D as centre, describe a circle cutting the first circle at G and H, and with same radius and F as centre describe a circle cutting the first circle at J and K. Join CH and JK, produce them, and let them meet at F. F is the centre of the circle of which the arc AB is a part.

Fig. 11.—To Inscribe an Equilateral Triangle Within a Given Circle

Let CD be the radius of the given circle and DCE a diameter, with D as centre and DC as radius, describe a circle cutting the first circle at A and B. Join AE EB BA. Then AEB is the equilateral triangle required.

Fig. 12.—To Inscribe a Regular Pentagon Within a Given Circle

Let AEC and BED be two diameters of the given circle at right angles to each other, E being the centre of the circle. Bisect AE at F. With F as centre and radius FB, describe a circle cutting EC at G. Then with B as centre and BG as radius, describe a circle cutting the original circle at H and K. BH is one-fifth of the circumference of the circle, as is also BK, and by describing circles from KH with the same diameter cutting the original circle at L and M and, by joining BH HM ML LK KB, a pentagon as required is described.

(Continued in next issue.)

NEW CANADIAN PATENTS

(Continued from page 21)

fuel water grate provided in the major section, a flue extending from beneath the said grate to the top of the major section, an adjoining flue disposed horizontally between the said major section and the adjoining hollow disc section, and another flue disposed between the said hollow disc section and the hollow cap section of the boiler and around the aforesaid central conduit and extending from the aforesaid horizontal plane to the outside of the boiler.

MARKET CONDITIONS AND TENDENCIES

(Continued from page 19.)

about 2,500 tons of lead in the past week for prompt and November delivery at a base price of 6.85c to 6.90c New York. Local quotation 9¼c per pound.

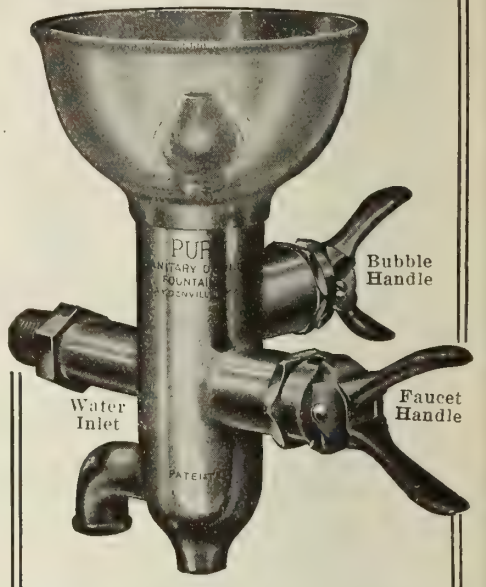
Antimony Unchanged

Canadian consumers have recently purchased considerable quantities of antimony in New York, which has strengthened the market there. Local quotations, however, are unchanged, at 15c per pound.

Aluminum Unchanged

Demand is less active, but the market holds steady, and prices are unchanged at 68c per lb.

PURO
(MADE IN CANADA)
Saves Dollars
Why let that old-fashioned faucet go on year after year wasting water—MONEY? Why more drinking cups and glasses, only to become unsanitary—lost, broken or carried away? Puro Sanitary Drinking Fountain stops all this needless waste. Puro saves you 35% on the water bill alone. Puro saves you all that money you spend for cups. YET Puro is always ready with a clear, cool drink with dollars in the bank.



Puro Pays for Itself
You don't have to wait years to get back the small investment you have tied up in Puro equipment—
You start cashing in at once—not only on your water bill saving, but on the increased efficiency of your workers as well.
Men like PURO—it's clean. No danger of deadly germs lurking in its sparkling bubble.
Write us—tell how many men, how many departments, and we'll tell you how much the cost will be to

"PURO-FY"
YOUR WATER SUPPLY
Puro Sanitary Drinking Fountain Company
147 University Ave., Toronto, Canada

Stopping an advertisement to save money is like stopping a clock to save time. Advertising is an insurance policy against forgetfulness—it compels people to think of you.

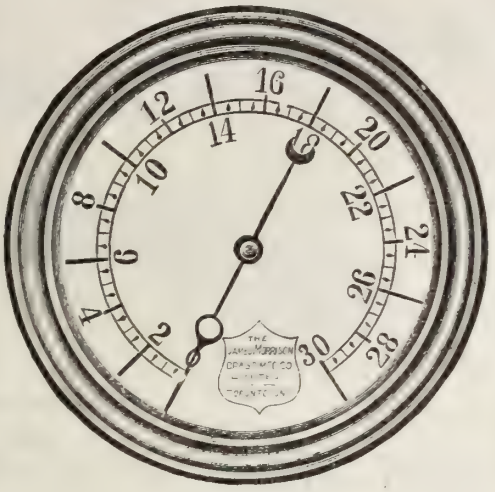
MORRISON IMPROVED PRESSURE GAUGES

Our Ammonia Gauges

To withstand the action of Ammonia Gas, are constructed of Steel Tube-Springs connected to Malleable Iron Sockets and have **all-Iron** Movements.

The Iron Case is fitted with heavily nickeled Brass Ring.

Pressure graduations are from 100 lbs. to 500 lbs. Also with 30 inches Vacuum Scale when so ordered.



Manufacturers of Steam, Vacuum and Combination Gauges; Locomotive and Duplex Gauges; Morrison's Standard Test Gauges; Hydraulic, Altitude, and Sprinkler Alarm Gauges; Combination Water Works Gauges; Pyrometer Gauges; Engineers' Clocks and Revolution Counters; Pressure Gauge Testers; Pyrometers for Bakers Ovens; Recording Pressure and Temperature Gauges; Blast Pressure Gauges.

Dealers in Thermometers for Heating Installations; Feed Water; Flue Gas, etc.

All our instruments are of the very highest quality and utmost reliability, and are sold under a full guarantee of satisfaction. Approved by Provincial boiler and steamboat inspectors.

We are prepared to give necessary attention to all kinds of gauges requiring repairs.

THE JAMES MORRISON BRASS MFG. CO., LIMITED

93-97 Adelaide Street West, TORONTO, ONTARIO

Our Mixed Metal Sales Amount to Over $5,000,000 Annually

HOYT'S WIPING SOLDER is as perfect as experience and first class ingredients can make it. As only one perfect Wiping Solder can be made we manufacture only one grade, which must necessarily be Hoyt's high standard of quality.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends. Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO

New York, N. Y.; London, Eng.; St. Louis, Mo.

OUR POSITIVE CIRCULATOR

Will Solve Your Hot Water Circulation Troubles

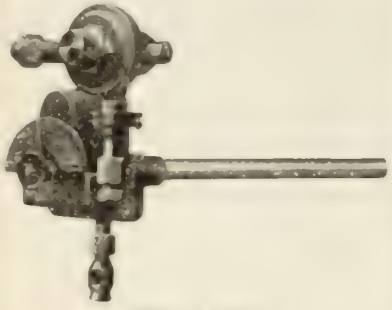
By using our Positive Circulators you can save money on the cost of your hot water jobs and get much better control of them when in operation. Simple to install and easy to operate, they will increase the circulation in the system whether the water is hot or cold, and at the same time they are absolutely safe, as no closed system is necessary. A good line for you to install also on unsatisfactory jobs, greenhouses, garages, etc.

WRITE US FOR FURTHER INFORMATION.

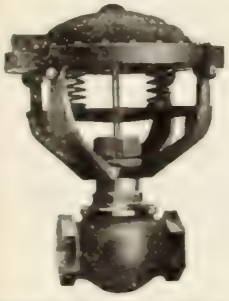
Robert Angus, HEATING SPECIALIST **514 William Street, London, Ont.**

POWERS MONEY SAVERS

No. 10 Tank Regulator



REGULATOR



Applied to Domestic Water Heaters. Prevents Over-heating and Saves Steam.

DIAPHRAGM VALVE

Satisfaction Guaranteed

Powers Shower-bath Controller a Thermostatic Mixing Valve which insures a constant temperature.

Easily adjusted to any desired temperature.

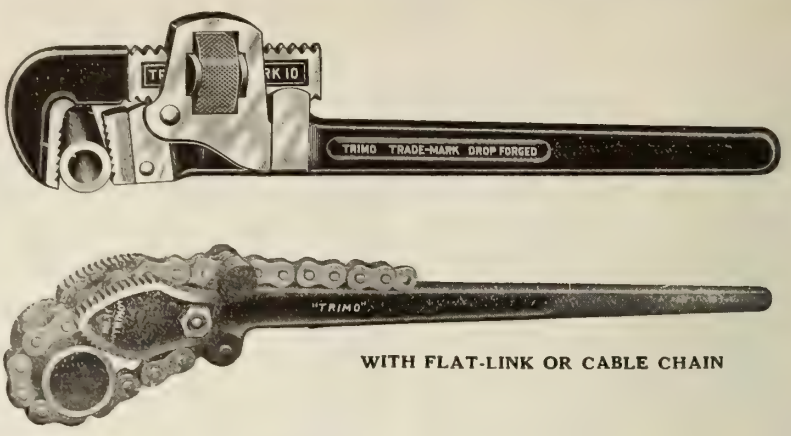
Positively Anti-Scalding.

The Canadian Powers Regulator Co., Ltd.

115 Bay Street, TORONTO

World-Famed Specimens of the Age of Steel

TRIMO



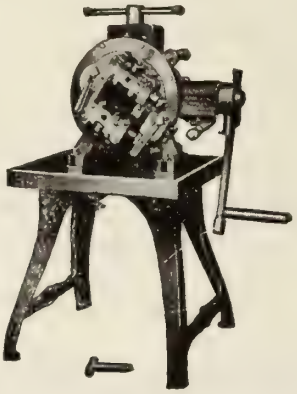
WITH FLAT-LINK OR CABLE CHAIN

TOOLS

Send for Catalog No. 91

MADE BY

TRIMONT MFG. CO., 55 Amory Street, Roxbury, Mass., U.S.A.



No. 00

PIPE MACHINES

Either Hand or Power

This machine cuts off and threads pipe from 1 in. to 4 in., right or left.

Threads Rods from ½ in. to 2 in., right or left.

American or Whitworth Threads.

Using the genuine Armstrong Dies.

All parts are interchangeable.

A time and labor saving machine.

Manufactured by

THE ARMSTRONG MFG. CO.

317 Knowlton Street

BRIDGEPORT, CONN.

WRITE FOR CATALOGUE

IF CAR IS RIGHT ADVERTISING PAYS

This is Experience of John N. Willys, Who Plans Biggest Campaign.

"This year as heretofore we shall continue our liberal advertising programme in national publications, farm and trade papers, and we will also conduct a larger newspaper campaign than ever in the past," declared John N. Willys, head of the great Willys-Overland Company, of Toledo, in answer to a question concerning his future advertising plans. "We find our various models of cars even more attractive than ever before; careful and shrewd buying has fortified us against any possible shortage of materials; the country is enjoying an unprecedented wave of thrift and prosperity, and our factory facilities, including new buildings and equipment, are sufficient to warrant an output of 300,000 cars for the year.

"Advertising is just as essential in the modern manufacturing business as is the factory in which the product is turned out," concluded Mr. Willys. "If you are building a product of real worth and merit, it is obvious that you should inform the public of that fact and thus build up a market for your product. The man who has something worth while to sell and does not advertise that fact is hiding his light under the proverbial bushel and, nine times out of ten, he gets nowhere.

"When I authorize an advertising appropriation I first make myself absolutely certain that the models of cars which we are producing are worth talking about. I want to be sure that we have something in which every reader of advertising will be especially interested. Then, too, one must take into consideration the general conditions existing as to availability of material markets, general tone of prosperity throughout the country—because if the people haven't money there is no use in trying to sell them automobiles—and also consider our factory conditions relative to the size of the output which we can safely figure on turning out."

You can talk across the continent for two cents per word with a WANT AD. in this paper.

Every Day Is Pay Day

THAT'S right—every day you work **our plan**, your pay is given you. "Pay yourself first" that's the idea of our representative plan. When you devote ten hours daily acting as our representative—your pay is sure and certain.

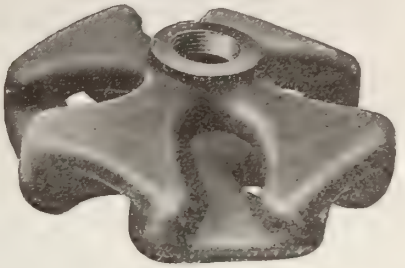
We need a hustling representative right in your district. A young man capable of producing good business, preferably one with salesmanship experience. The position will pay big money to one with enthusiasm, energy and ability. Do you know, or are you such a man?

If you are and are willing to exchange **your spare time**, representing our publications, **we will** show you how that same spare time, properly used, **will produce** for you as much **cash** as your regular income.

Does this interest you, if so write us TO-DAY and we will tell you all about it.

The MacLean Publishing Co.
LIMITED
143-153 University Avenue, Toronto, Ont.

The Hotstream HEATS IN A HURRY TRADE MARK REG. WATER HEATER



PRICE, $1.25

Hotstream Generator

A Real Auxiliary Furnace Water Heater

Placed in an out-of-the-way corner of the furnace it will supply plenty of piping hot water for a 30-40 gallon tank at no extra cost, thus eliminating the use of your gas heater during the winter months.

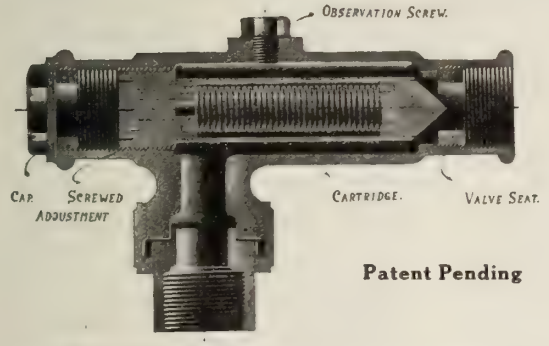
Composed of eight fan shaped leaves over-lapping at their outer edges. No water way through the centre. A free unobstructed water travel. Nothing to get out of order. No baffle plates or dead arms.

Installed just above the fire—not in it.

Diameter 7 in.; height 3½ in.;
1 or 1¼ in. water connection.

Put up in a neat parcel post package.

THE HOTSTREAM HEATER COMPANY
Cleveland, Ohio



Patent Pending

The "WELO" Trap is guaranteed to pass air or water freely, but to shut off against steam.

"WELO" TRAPS

For High and Low Pressure Steam, Vacuum or Vapor Heating.

Made in Canada

BY

VICI RADIATOR COMPANY

HAMILTON, ONTARIO

GENUINE BELL WASHERS

FULLER

The only washer made that will stand hot and cold water. Look for the name on every washer. None genuine without it.

Sold By All Canadian Jobbers.

Manufactured only by

Estate of Andrew Bell

2-4-6 Commercial St. Newark, N.J.

DARLINGS STEAM APPLIANCES

DARLING BROTHERS
LIMITED
Engineers and Manufacturers
MONTREAL, CANADA

Branches: Toronto and Winnipeg
Agents: Halifax, St. John, Calgary, Vancouver

Classified Buyers Guide

Occasionally advertisements are inserted in the paper after this page has gone to press. The insertion of the Advertiser's name on this page is not part of the advertising order, but is inserted solely for the convenience of the reader of the paper

Air Line Systems.
[illegible] Brass, Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Air Valves.
Empire Mfg. Co. Ltd., London, Ont.
Canadian Wolverine Co., Ltd., Chatham.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
[illegible] Brass, Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
[illegible] Brass, Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
[illegible] & Radiation Ltd., Toronto.

Asbestos Goods.
James Morrison Brass Mfg. Co., Toronto.

Boilers, Steam or Hot Water.
[illegible] & Burnham Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Boiler Feed Regulators.
[illegible] Brass, Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Brass Goods, Valves, etc.
Empire Mfg. Co. Ltd., London, Ont.
Canadian Wolverine Co., Ltd., Chatham.
[illegible] Brass, Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Galt Brass Co. Limited.
[illegible] Brass, Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Ltd., Walkerville.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
[illegible] Fountain Co., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.
Speakman Supply & Pipe Co., Wilmington, Del.

Brass Pipe and Tube.
B. G. T. Manufacturing Co., Toronto.
[illegible] Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
[illegible] Co., Ltd., London, Ont.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Speakman Supply & Pipe Co., Wilmington, Del.

Bubblers.
[illegible] Co., Ltd., London, Ont.
[illegible] Co., Ltd., Toronto.
Puro Sanitary Drinking Fountain Co., Toronto.

Cellar Drainers.
Robert Angus, London, Ont.
[illegible] Brass Co., Limited.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Chain Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Closets.
Empire Mfg. Co. Ltd., London, Ont.
Canada Metal Co., Ltd., Toronto.
Cluff Mfg. Co., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Country Residence Equipments.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
[illegible] & Mfg. Co., Fort Wayne, Ind.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Limited, Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Damper Regulators.
[illegible] & Co., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Drainage Fittings.
[illegible] Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.
[illegible] Foundry Co., West Toronto.

Drinking Fountains.
Canada Metal Co., Ltd., Toronto.
[illegible] Foundry Co.
Puro Sanitary Drinking Fountain Co., 342 Craig St. West, Toronto.
Speakman Supply & Pipe Co., Wilmington, Del.

Ejectors, Steam.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville.

Ejectors for Sewage.
[illegible] Co., Ltd., Montreal.
National Equipment Co., Ltd., Toronto.

Enamelware.
Amherst Foundry Co., Amherst, N.S.
Canada Metal Co., Ltd., Toronto.
[illegible] Co., 32 Front St., Toronto.
Galt Brass Mfg. Co., Galt.

James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.
Port Hope Sanitary Mfg. Co., Ltd., Port Hope.

Electric Pumping Machinery.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Empire Mfg. Co., Ltd., London, Ont.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Faucets.
Canada Metal Co., Ltd., Toronto.
Empire Mfg. Co., Ltd., London, Ont.
Puro Sanitary Drinking Fountain Co., Toronto.

Fittings.
Canada Metal Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Flushometers.
Canada Metal Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Empire Mfg. Co., Ltd., London, Ont.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.
Speakman Supply & Pipe Co., Wilmington, Del.

Floor and Ceiling Plates.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
Canada Metal Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Galt Brass Co., Limited.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
James Morrison Brass Mfg. Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Gasoline Engines.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.

Gas Water Heaters.
Galt Brass Co., Limited.
Holstream Heater Co., Cleveland.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Oster Mfg. Co., Cleveland.

Generators.
W. E. Clark & Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.

Heaters.
Darling Bros., Ltd., Montreal.
Lord & Burnham Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Lead.
Canada Metal Co., Ltd., Toronto.
Galt Brass Co., Limited.
Hoyt Metal Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Mixing Valves.
Canada Metal Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Port Hope Sanitary Mfg. Co., Ltd., Port Hope.
Speakman Supply & Pipe Co., Wilmington, Del.

Monkey Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Oil Storage Systems.
National Equipment Co., Ltd., Toronto.

Packing.
Canadian Wolverine Co., Ltd., Chatham.

Packless Radiator Valves
W. E. Clark & Co., Toronto.
Kerr Engine Works, Walkerville.

Pipe and Radiator Hangers.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.

Pipe, Black and Galvanized.
Canadian Tube & Iron Co., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Pipe Cutters.
Trimont Mfg. Co., Roxbury, Mass.

Pipe Joint Compounds.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

Pipe, Soil, and Fittings.
Anthes Foundry Co., Toronto and Winnipeg.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Warden King, Ltd., Montreal.

Pipe Threading Tools and Machinery.
Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.
A. B. Jardine & Co., Hespeler.
Oster Mfg. Co., Cleveland.

Pipe Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

Porcelain Ware.
Canada Metal Co., Ltd., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Pumps.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
Galt Brass Co., Limited.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto.
Robert Angus, London, Ont.

Radiators.
Lord & Burnham Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., New Britain, Conn., U.S.A.

Radiator Traps (Steam).
W. E. Clark & Co., Ltd., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Reducing Pressure Valves.
Canada Metal Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Septic Tank Valves and Syphons.
Anthes Foundry Co., Ltd., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
West Toronto Foundry Co., West Toronto.
Anthes Foundry, Ltd.

Solder.
Canada Metal Co., Ltd., Toronto.
Hoyt Metal Co., Toronto.

Steam Specialties.
W. E. Clark & Co., Ltd., Toronto.
Darling Bros., Ltd., Montreal.
Dart Union Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville, Ont.

Steam Traps.
Canadian Morehead Co., Ltd., Woodstock.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Smoke Test Machines.
James Morrison Brass Mfg. Co., Toronto.

Tanks, Steel and Wood
Ontario Wind Engine & Pump Co., Toronto.
National Eqt. Co., Ltd., Toronto.

Temperature Boosters
W. E. Clark & Co., Toronto.

Testing Plugs.
James Morrison Brass Mfg. Co., Toronto.

Tools.
Armstrong Mfg. Co., Bridgeport, Conn.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Nicholson File Co., Port Hope, Ont.
Williams, J. H., & Co., Brooklyn, N.Y.
Oster Mfg. Co., Cleveland.

Unions.
Canada Metal Co., Ltd., Toronto.
Dart Union Co., Ltd., Toronto.

Vapor Heating Systems.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
W. E. Clark & Co., Ltd., Toronto.

Vitro Tanks
Cluff Mfg. Co., Toronto.

Vacuum Systems of Heating.
W. E. Clark & Co., Toronto.
Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Water Supply Systems.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Fort Wayne Eng. & Mfg. Co., Fort Wayne, Ind.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
Ontario Wind Engine & Pump Co., Toronto
Empire Mfg. Co. Ltd., London, Ont.

The Service That Pays

"King" Boiler Service

WHEN you sell and install a "King" Boiler, you have secured a lasting customer, because the "King" Boiler is built for service—"Long Service."

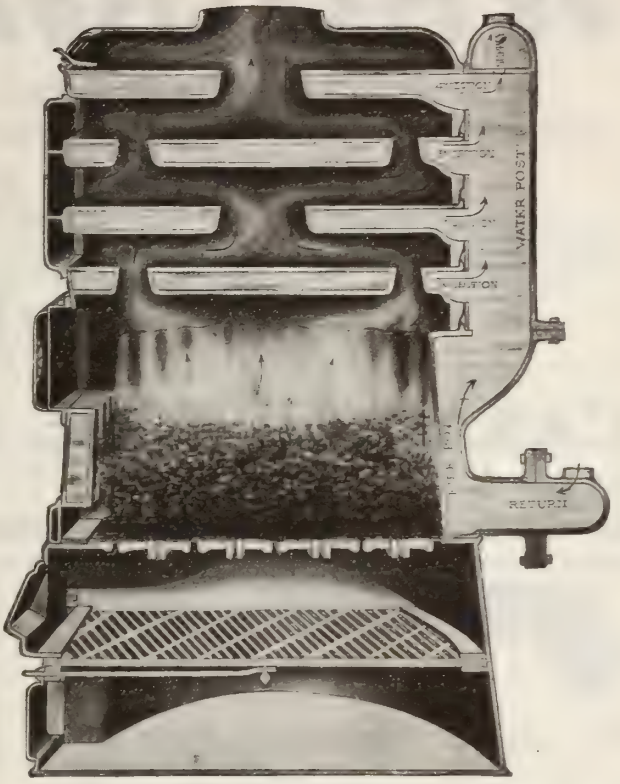
IT is not the boilers which have the largest heating surface that give highest efficiency. But rather the construction of the boiler which assists the water to absorb the most heat units, thus ensuring maximum of service at minimum fuel cost.

STEEL and RADIATION, Limited

Head Office: FRASER AVENUE, TORONTO

304 University Street, MONTREAL **101 St. John Street, QUEBEC**

AGENCIES IN ALL LEADING CITIES



Sectional View "KING" Boiler

ALPHABETICAL LIST OF ADVERTISERS

Occasionally advertisements are inserted in the paper after the index has been printed. The insertion of the Advertiser's name in this index is not part of the advertising order. The index is inserted solely for the convenience of the readers of the paper.

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Trimont Manufacturing Co. 32

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United Electric Co. 2

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WROUGHT PIPE

BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.

All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED

Montreal Works: Lachine, Can.

They won the "Grand Prize" of the P.P.I.E.

The Improved "Vulcan" Chain Pipe Wrench

MACHINE TESTED

Enduring, Powerful and Safe

J. H. WILLIAMS & CO.

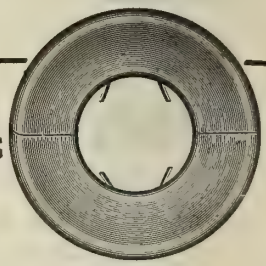
77 Richards Street BROOKLYN, N.Y. CITY

The Wrench People

Western Office and Warehouse: 40 So. Clinton St., Chicago

OPEN VIEW NO. 10-A.

The CEILING PLATE that's better



TOP VIEW NO. 10-A.

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Gem No. 4.

The split ceiling plate is coming more and more into use than ever and ALWAYS GIVES A NICE FINISH, because it can be attached to mains and risers at the very last, and is not exposed during completion of a building on the floors.

High quality at the right price.

Gem No. 4 Automatic Air Valve

Made from the best brass obtainable. Pressed shell and pressed brass base which eliminate danger from blowholes, which is a fault with cast bases.

Write for catalog showing our complete line of specialties.

The BEATON & CADWELL MANUFACTURING Co.

New Britain, Conn.

Eastern Agent: J. R. Devereux & Co., 233 St. James Street, Montreal. Western Agent: A. E. Hinds & Co., Chamber of Commerce, Winnipeg.

OSTER-CUT THREADS

OSTER PIPE-THREADING TOOLS

complete 47 distinct die stocks, bench and tripod tools and pipe machines—all having the speedy Oster action. Ask for catalog.

2084 OSTER MFG. CO., 2160 E. 61st St., CLEVELAND, OHIO

TWO CENTS PER WORD

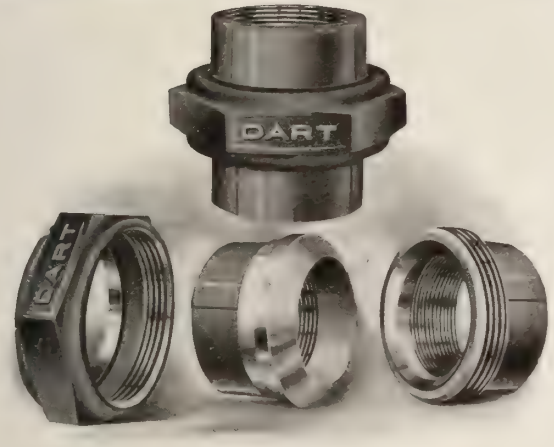
You can talk across the continent for two cents per word with a Want Ad. in this paper.

Make the work you do advertise your business

Good work holds customers, and is the means of getting many new ones.

Make sure when you leave a pipe coupling job that the joint will remain permanently tight by using

DART **Dart Unions** DART



Both faces of the joint being bronze, there is no deterioration.

The iron parts are extra heavy; they cannot stretch nor pull apart.

Another advantage of using Dart Unions is that they are easily and quickly connected, whether pipes are in or out of line.

Sold by all first-class supply houses. Absolutely guaranteed.

Manufactured by
DART UNION CO., Limited
Toronto, Canada.

KERR GATE VALVES

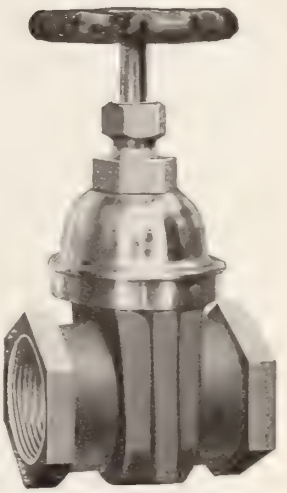
I. B. GATE

These Iron Body Gate Valves were designed and are made by US to meet YOUR demand for strong, substantial, interchangeable valves, with "nobby" appearance.

They meet the requirement and more. When they get us a customer they hold him.

Who in the Steamfitting trade has not heard of and used Kerr's (Weber) Brass Gate Valves? We say "Kerr's"—not the imitations. We make this valve of uniform material, and they stand up to the work given them, just as they always have. Some have tried others, but they came back to the tried and trusty old "Weber Gate" made by Kerr. What is a few cents on a valve, when you can get one like the genuine "Weber"?

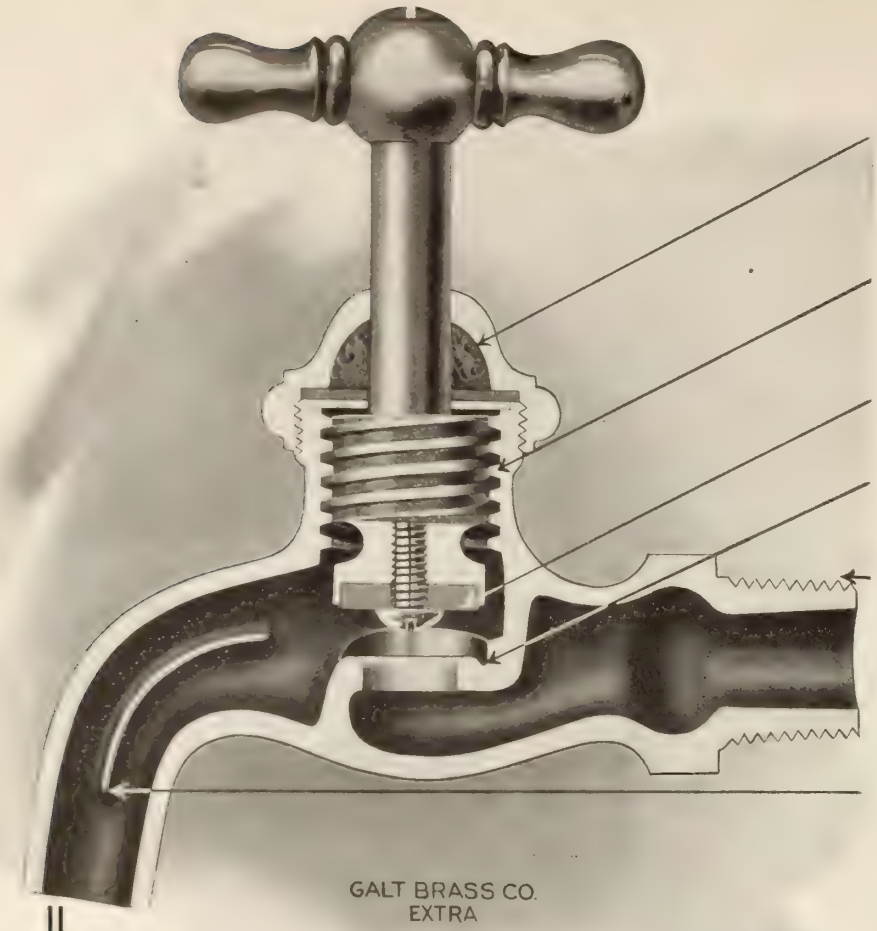
Have you our Catalogue No. 5 ?
If not, we will mail you one.
A postal to-day will bring it.



BRASS GATE

THE KERR ENGINE COMPANY, LIMITED
WALKERVILLE, ONTARIO

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. X | Publication Office: TORONTO, NOVEMBER 15, 1916 | No. 22

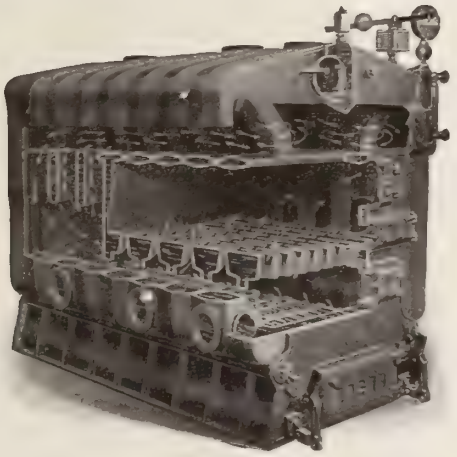


PLATE A2413—Smokeless Down Draft Boiler

FILE COPY

Empire Boilers and Radiators

We carry in stock a complete line of Boilers, Radiators, Tank Heaters and Heating Specialties.

These products have been manufactured under the world's most highly developed scientific methods of test and manufacture, ensuring standardization, uniform working results and great durability.

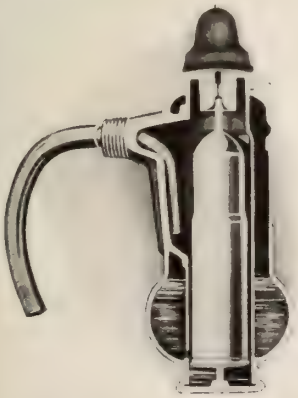


PLATE A2450—Norwall Syphon

When only the finest quality in Plumbing or Heating material is required, specify "Empire."

Write Us for Prices.

Catalogue A sent on request.

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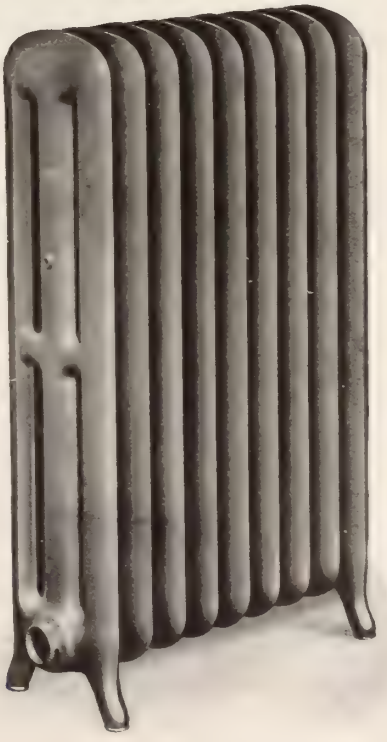


PLATE A2430—Plain Three Colum

Empire Mfg. Co., Limited

LONDON TORONTO

A Beaver Brand Pedestal
is a Lavatory Fixture Worth While

A HIGH GRADE LAVATORY THAT CANNOT BE SURPASSED

A bathroom which is fitted with Beaver Brand cast iron enamel ware bears the stamp of quality and lasting service, and a pedestal lavatory puts such a bathroom in a class by itself.

Ask your jobber for BEAVER BRAND CAST IRON ENAMEL WARE

Amherst Foundry Co., Limited

General Offices and Factory: Amherst, Nova Scotia

AGENCIES:

ONTARIO:
Monarch Brass Mfg, Co., 71 Brown St., Toronto

MANITOBA and NORTHWEST:
E. B. Plewes, 120 Lombard St., Winnipeg

Everything in Rubber

CANADIAN CONSOLIDATED RUBBER CO., LIMITED
DOMINION
RUBBER SYSTEM
AND ASSOCIATED COMPANIES

Made in Canada

Quality and Variety

PLUS

Value and Service

GIVE

Absolute Satisfaction

If you have not proved it, write to our nearest Branch or direct to Head Office for anything you may need in Rubber and see for yourself how we aim to serve and please you.

Canadian Consolidated Rubber Co.
LIMITED

Executive Office—Montreal, P.Q.

Branches at Halifax, N.S., St. John, N.B., Moncton, N.B., Quebec, Que., Ottawa, Ont., Toronto, Ont., Hamilton, Ont., Brantford, Ont., London, Ont., Kitchener, Ont., North Bay, Ont., Fort William, Ont., Winnipeg, Man., Brandon, Man., Regina, Sask., Saskatoon, Sask., Calgary, Alta., Edmonton, Alta., Vancouver, B.C., and Victoria, B.C.

BE A SPECIALIST

And Specialize in

TUEC STATIONARY CLEANERS

THE TUEC stationary cleaner is the final word in sanitary housekeeping. It is the direct result of many years of *special* experiments by a force of inventors and expert mechanics working together.

There is nothing just as good, and there is certainly nothing better than the TUEC stationary cleaner. Not only does it clean all dust out of a home, but while doing so it ventilates the home.

MADE IN CANADA

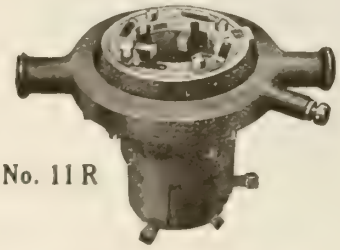
PURE AIR, pure food and pure water are necessities to healthful living. But the most important of these is pure air.

SANITARY ENGINEERS are experts at piping buildings. Why not pipe the next job for a TUEC?

If in doubt ask us.

The United Electric Company

159-161 Richmond St. W., Toronto, Ontario



No. 11 R

"Jardine" Adjustable Ratchet-Threading Tool

Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely [illegible] chips and dirt.

YOU CAN REDUCE THE LABOR OF PIPE THREADING 50 PER CENT., AND MAKE THREADS AS CLEAN AND PERFECT AS IF CUT ON A LATHE WITH ONLY ONE CUT WITH

"Jardine" and "Toledo" Pipe-Threading Tools

"Jardine" or "Toledo" dies spare the muscle of the man who does the work, and save money for the man who pays the wages, as they enable one man to do the work of two and costs less for repairs. No cams or jimcracks to wear and get out of order. Cutters that cut, don't squeeze. Set of cutters for each size of pipe. Lead screw ensures perfect pitch and form of threads. Adjustable to all variations of fittings, very durable cutters.

All threads finished at one cut. One man does the work of two.

It will pay you to look well into the merits of the "Jardine" and "Toledo" before placing your next order for tools of this kind.

Write for catalog and full particulars.

We'll gladly supply the names if you wish to have a chat with users in your town.

MADE IN CANADA

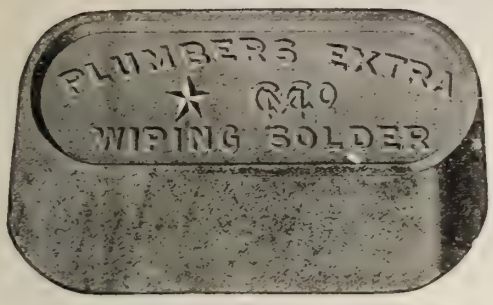
A. B. JARDINE & CO.

HESPELER, ONT.

Sole makers of "Jardine" Pipe-Threading Tools.
Sole licensees to manufacture and sell Toledo Pipe-Threading Tools in Canada.
Agents, Winnipeg and West—Stanley Brock, Ltd., Winnipeg, Man.
Brockville and East—J. R. Devereux, 233 St. James St., Montreal.

We Sell Everything You Use

PLUMBERS' EXTRA STAR



HIGHEST GRADE WIPING SOLDER.
5 lbs. each.

Ask Us

Patent Soil or Waste Pipe in lengths of 8 feet.

You cannot buy better lead waste pipe traps and bends in Canada than what we make. **And we make them.**

Even thickness and purity of metal is one of the outstanding features.

EASY WIPING SOLDER

THE PLUMBER'S FAVOURITE
SECOND ONLY TO OUR EXTRA STAR
7 lbs. each.

We make

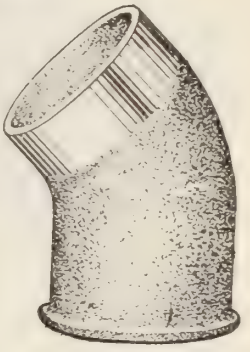
IMPERIAL Soldering Nipples

Without Doubt the Best Soldering Nipples You Ever Saw.

They Have Quality, Weight and Finish.

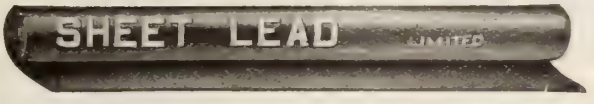
READ,
MARK,
LEARN

BRASS FERRULES



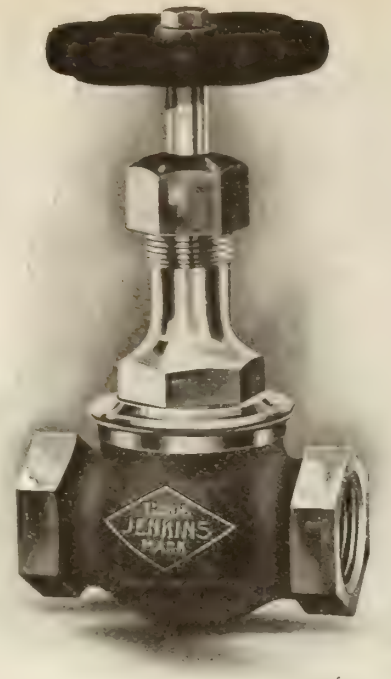
Our brass ferrules are high grade, free from sand holes, easy to tin, and sound in every detail.

Write for Catalogue "A"—Mailed Free.



We pride ourselves on being able to furnish the finest sheet lead in Canada in any length, width (up to 7 feet) and thickness.

THE CANADA METAL CO., LIMITED
Toronto



From the time when put in service and for years after they are installed

JENKINS BROS'. VALVES

are a source of satisfaction to the user. With a little attention now and then, they will give permanent service and satisfaction.

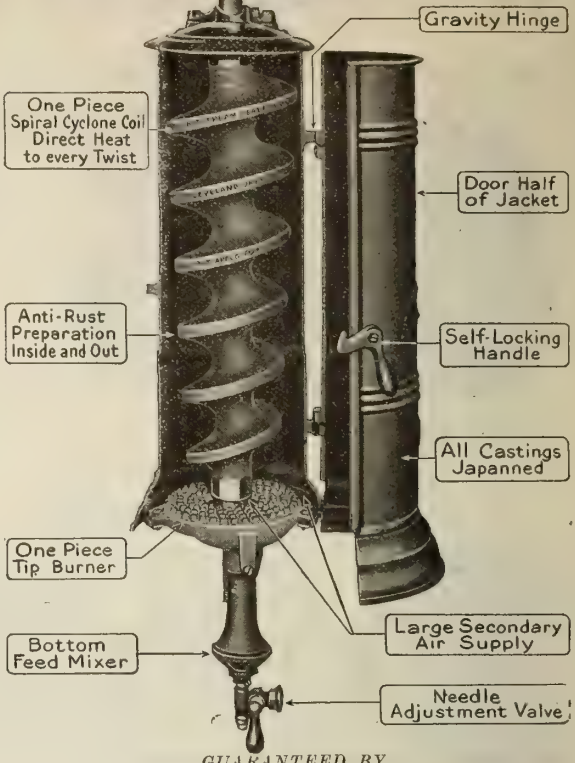
They do not give out or require replacement, due to the fact that most of the wear is taken by the dependable but inexpensive JENKINS' DISC, and also because in the manufacture of the valves the most careful attention is given to every detail in design, metal and workmanship.

Consult Catalogue No. 8.

Jenkins Bros. Limited

103 St. Remi St. Montreal

The Hotstream
WATER HEATER

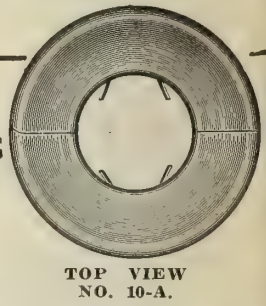

Gravity Hinge
One Piece Spiral Cyclone Coil Direct Heat to every Twist
Door Half of Jacket
Anti-Rust Preparation Inside and Out
Self-Locking Handle
All Castings Japanned
One Piece Tip Burner
Large Secondary Air Supply
Bottom Feed Mixer
Needle Adjustment Valve

GUARANTEED BY

THE HOTSTREAM HEATER CO. - CLEVELAND

OPEN VIEW NO. 10-A.

The CEILING PLATE that's better



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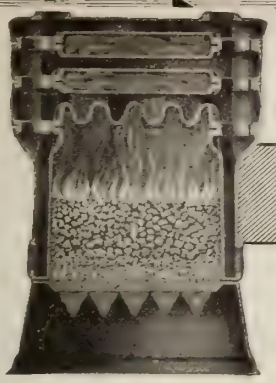
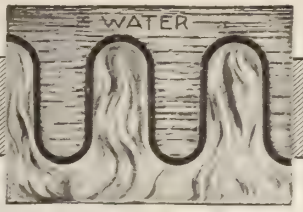




Concerning Burnham Fire Surface and Fire Travel

THE broader the fire surface, and the longer the fire travel, the shorter the coal bill's going to be. This is a self-evident fact that's so evident it needs no evidence to prove it. But what you do want is evidence that a boiler really has the broad surfaces and long fire travel.

Here, then, is how the Burnham Boiler answers the call on surface and travel.

The fluted crown sheet section of the Burnham, shown in the cut at the left, more than doubles the surface directly over the fire. For if you could pull out this fluted-up surface you would have a flat topped crown sheet section a good bit more than twice as wide.

The cut open side view of the Burnham, shown at the right, gives you a splendid idea of how the hot smoke and gases travel back and forth between the heat-absorbing water lined flues, before they get to the smoke pipe. So that every bit of heat that it is practicable to "harness," goes into the radiator, instead of the best part of it going up the chimney.

Broad fire surface and extra long fire travel, are two reasons why the Burnham is so easy on pocket books.

Our catalog tells about the others. Send for it.

We sell to the recognized Jobber and legitimate Plumbing and Steamfitting Trade only. No goods sold retail.

Lord & Burnham Co. Limited of Canada

(Boiler Department)

Royal Bank Bldg., TORONTO — **Factory: ST. CATHARINES, ONT.**

Burnham Cosy Comfort Heat BB

Bath-Room Trimmings for Xmas Gifts

Pleasing **Practical** **Ornamental**

"Gifts that are Appreciated"

Make your Selections from "WOLVERINE" Line.

EVERY ARTICLE UNCONDITIONALLY GUARANTEED.

Canadian Wolverine Co., Limited, Chatham, Ontario

Using Them For Fifty Years

Many firms have been using the "Famous Five" Files for half a century.

Their efficiency has become a tradition, because the constant improvement of their cutting qualities has kept abreast of the demands of modern shop practice.

Specify them when ordering.

They are:

KEARNEY & FOOT **GREAT WESTERN**
AMERICAN **ARCADE** **GLOBE**

(Made in Canada)

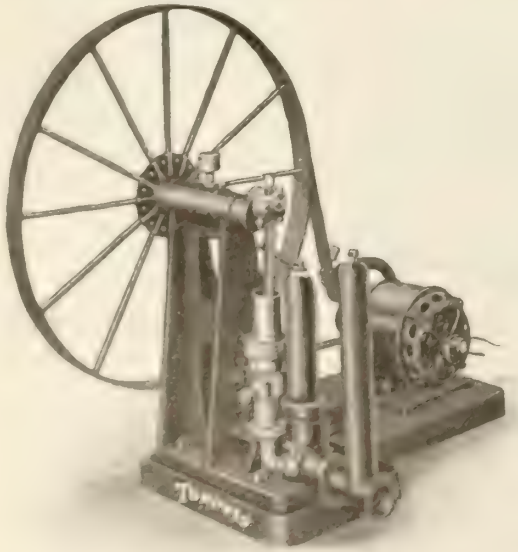
THE NICHOLSON FILE COMPANY, Port Hope, Ontario

(Dealers Everywhere)

ONTARIO WIND ENGINE & PUMP CO. LIMITED

TORONTO

It will not pay you to deal with a firm [illegible] a sliding scale of prices. The plumber who [illegible] doesn't stay in business long; the same [illegible] Moreover, a manufacturer [illegible] prices to suit special circumstances is [illegible] quality [illegible]



The satisfactory operation of any water supply system depends on the Motor, Pump and Tank. If these do not do their work right, the whole outfit will be worthless. Therefore, you cannot afford to experiment with equipment of doubtful quality. The only sure way is to buy by name and reputation. The price may be a little higher but the quality and the liability is a standard part of every article sold under the name

ONTARIO WIND ENGINE & PUMP CO. LIMITED
TORONTO

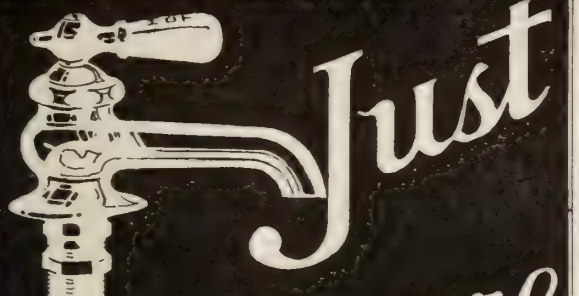
When you figure on your next job, tell your customer that you will supply goods bearing the above name. You will find it easier to close the deal, for he knows that it stands for a square deal and a good quality.

If you require further information or advice, write to our nearest office to-day.

Ontario Wind Engine & Pump Co., Ltd.

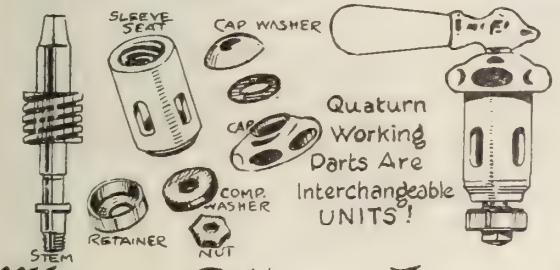
Montreal **TORONTO** **Regina**

When writing advertisers please mention that you saw their advertisement in the SANITARY ENGINEER."



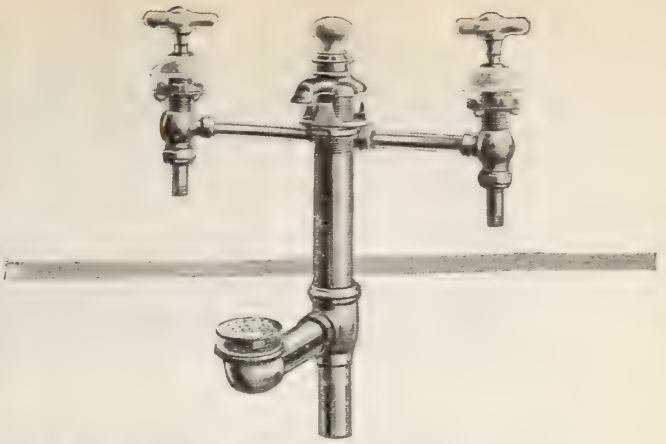
Just Compare The Celebrated SYDENHAM BRAND Quaturn

"OPENS WITH A QUARTER TURN CLOSES WITH THE PRESSURE"



What Other Faucet Has Removable Seat And Interchangeable Working Parts? Send For a Trial Pair: Test Them For Yourself.

WALLACEBURG BRASS & IRON MFG. CO. LTD.
WALLACEBURG, ONT.



SPEAKMAN
"UNIT" Fixtures (For Lavatories)

—which fit any stock lavatory drilled for two cocks and bi-transit waste, are proving big business-builders for plumbers everywhere.

Plumbers and Dealers find it to their advantage to buy their lavatories "stripped" and use the Speakman Unit when the job is installed. This enables supplying from stock a high-grade combination fixture (which discharges tempered water from a single nozzle) yet ties up less money in stock than when carrying special fixtures for each lavatory.

These fixtures are patented in the United States and Canada, but due to our large quantity production the cost is very low.

A complete stock of these fixtures is carried in Toronto, from where orders will be shipped, therefore they are duty free to you. Ask your jobber about SPEAKMAN UNIT, or write us direct for further information.

WILMINGTON SUPERIOR SPEAKMAN QUALITY DELAWARE

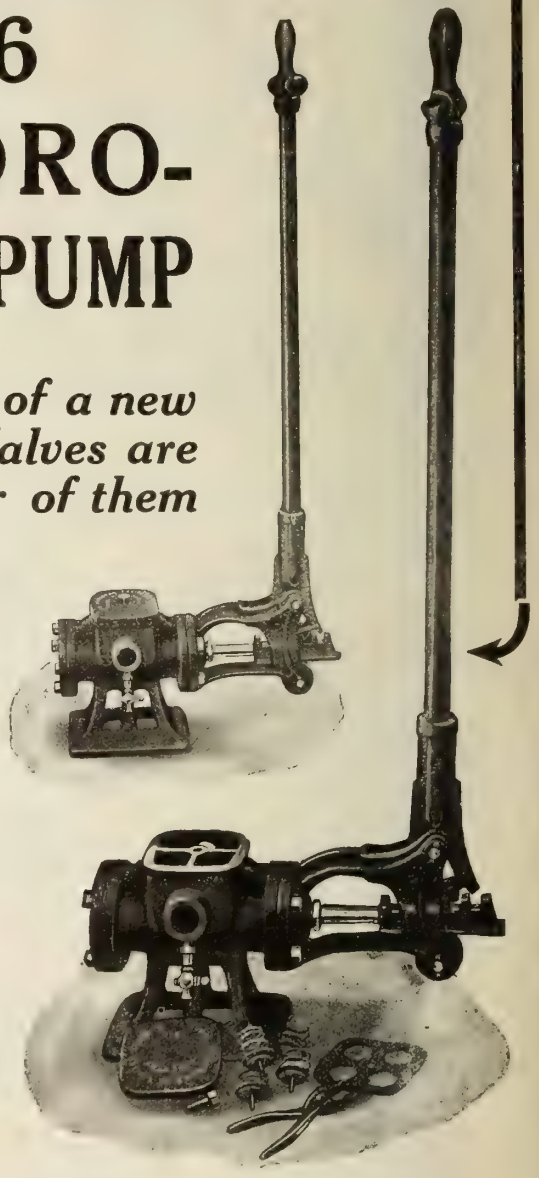
SPEAKMAN SUPPLY AND PIPE CO.
RIVERVIEW WORKS
WILMINGTON, DELAWARE
U.S.A.

SPEAKMAN

WATER Peerless SYSTEMS

MADE IN CANADA

THE NEW 016 PEERLESS HYDRO-PNEUMATIC HAND PUMP



Look at the cuts—they tell a story of a new departure—no copying here—the Valves are of the patented "Q" type. All four of them can be removed and replaced in twenty seconds—a pair of pliers to loosen one nut—that's all.

An eight-year-old boy can pump fifty pounds pressure.

The design is new, and it's right. The price is as low as you have to pay for an ordinary pump.

The ease of its operation will astonish you—and that's what gets you customers.

(ASK FOR BULLETIN No. 65)

"Q" Foot Valve

A Brass Seat in a one-piece casting, a thin, flexible leather seal. That's the story.

"It Just Can't Leak"

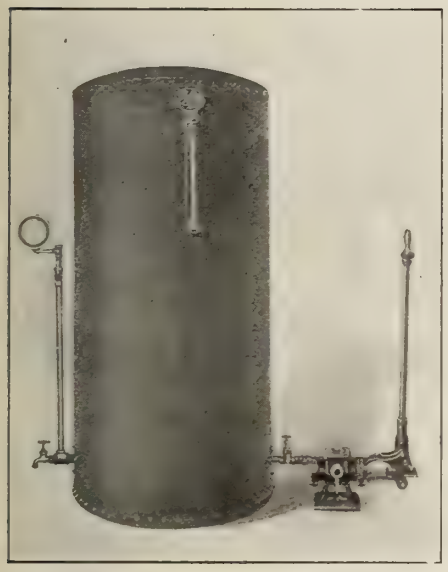
National Equipment Co., Limited

Toronto - Ontario

WATER Peerless SYSTEMS

MADE IN CANADA

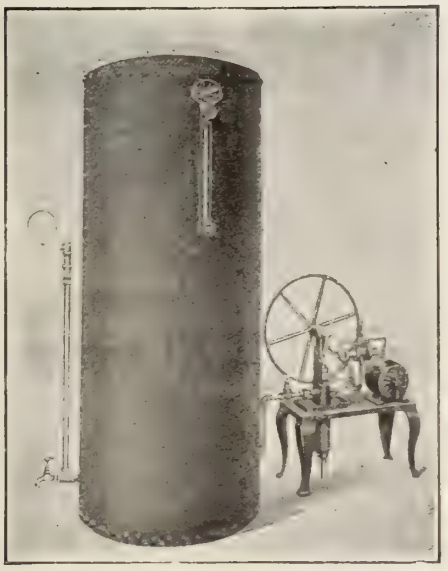
THREE PURE CANADIANS



(Ask for Bulletin No. 65)

112 SERIES

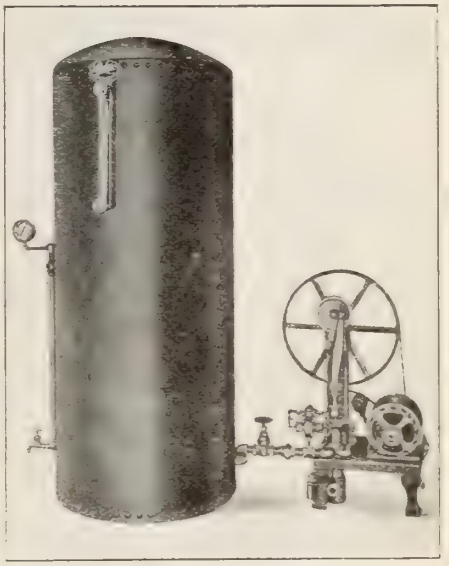
Fitted with the new 016 Hand Pump, conceded to be in an entirely new class. Will pump 50 lbs. pressure with less effort than is required for 25 lbs. with any other pump on the market—Patented "Q" Valves—and it costs no more.



(Ask for Bulletin No. 73)

300 SERIES

An Ideal Electric Equipment for domestic supply up to twelve people. Efficient, quiet and low priced. Costs practically nothing to operate.



(Ask for Bulletin No. 97)

500 SERIES

The finest Domestic Water System built — regardless of price or any other consideration. Will supply constant hose stream and is "as quiet as the foot of time."

Another Canadian

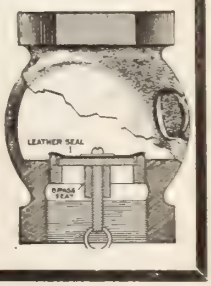
National Equipment Co., Limited

Toronto - Ontario

"Q" Foot Valves

are guaranteed not to leak a drop in 24 hours.

"They Just Can't Leak"



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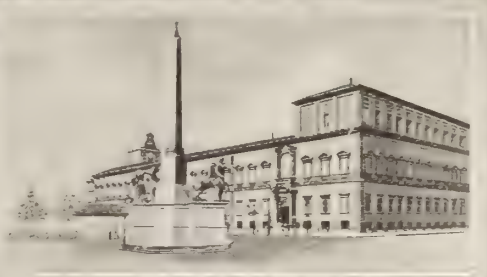

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SANITARY ENGINEER

PLUMBER AND STEAMFITTER OF CANADA

Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, NOVEMBER 15, 1916 No

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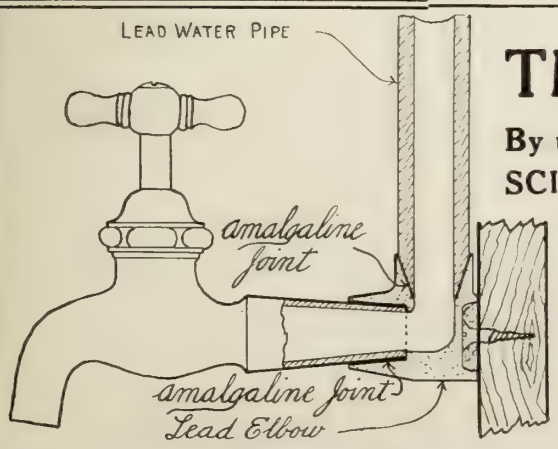

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THE SANITARY ENGINEER

VOL. X NOVEMBER 15, 1916 No. 22

A Discussion on Credits and Discounts

Read what Benjamin Franklin said about this question.

Showing the Benefits Derived From Paying Strict Attention to One's Credits—Meaning All Indebtedness C.R. or D.R.

BY ONE OF US.

Article VI.

ALMOST every phase has been discussed about credits and discounts in as many forms as possible at one time or another, yet every day appears to show another side to the question. Some person will say, "Why credits? Why discounts? Why not all cash?" A remark was recently heard to the effect that labor gives no credit; could not, in fact. However, we differ with this latter statement, because labor does give credit; every hour of labor must be given on credit hour by hour, day by day, and week by week. Sometimes more.

But there is a day set, a pay-day, a time and place where a final settlement is made, an account balanced with a gilt-edge payment, untrammelled by future obligations on either party interested. This is credit, but credit with due settlement, and that is our reason for publishing these articles. What is most of all desirable is a "settling-up day." Whether it be 5, 10, 15, 30, or even 90 days does not matter very much, except that if 5 days after receipt of goods an account is paid, and it is a universal practice; then it would take six times less money to run the business of the universe, that's all; and when a person buys at 15 or 30 days and actually pays in cash on those specified days, he must naturally pay a small proportion of cash for the loan of those goods. On the other hand, when a person or firm is able to turn over its capital several times a year, the overhead expenditure is reduced accordingly.

In reading over some of the writings of Benjamin Franklin, the following came to my notice, and the ideas seem to fit in so well with the line of thought embodied in these articles that I will quote them. They are from a short article entitled:

Hints to Those That Would be Rich.

"The use of money is all the advantage there is in having money.

"For six pounds a year you may have the use of one hundred pounds, **if you are a man of known prudence and honesty.**

"He that spends a groat a day idly, spends idly above six pounds a year, which is the price of using one hundred pounds.

"He that wastes idly a groat's worth of time per day, one day with another, wastes the privilege of using one hundred pounds each day for a whole year.

"He that idly loses five shillings' worth of time, loses five shillings, and might as prudently throw five shillings into the river.

"He that loses five shillings, not only loses that sum, but all the advantages that might be made by turning it into dealing, which, by the time a young man becomes old, amounts to a comfortable bag of money.

"Again, he that sells upon credit asks a price for what he sells equivalent to the principal and interest of his money for the time he is likely to be kept out of it; therefore, he that buys upon credit pays interest for what he buys, and he that pays ready money might let that money out to use; so that

"He that possesses anything he has bought pays interest for the use of it.

"Consider, then, when you are tempted to buy any unnecessary household stuff, or any superfluous thing, whether you are willing to pay interest, and interest upon interest for it as long as you live, and more if the thing grows worse by using.

"Yet, in buying goods, 'tis best to pay ready money, because

"**He that sells upon credit expects to lose 5 per cent. by bad debts**; therefore, he charges, upon all he sells on credit, an advance that shall make up that deficiency, and those who pay for what they buy on credit pay their share of this advance.

"He that pays ready money escapes, or may escape that charge."

No doubt some of these sayings are true. But even Benjamin Franklin did not strike the note quite true, particularly in the last paragraph quoted, "He that pays ready money escapes, or may escape that charge."

It would not be so bad if this were the case, but it is not. On the contrary, the man who pays cash is actually financing the person to whom he pays that cash to enable him to extend credit to a person who is, in actual fact, his competitor.

For instance, Jones is the man who sells goods. Smith and Brown buy goods from Jones. Smith pays cash and attends to his business. Brown buys on credit, and does not attend to his business. The consequence is, Smith is in competition with a man who does not play fair, for a time at least, but just sufficiently long to disorganize fair business dealings, with the result that all three suffer to some extent—Smith the worst of all, because if Jones loses on his transactions with Brown, he naturally has to raise the price of his goods to Smith. Therefore, Smith pays cash and "does not escape that charge" spoken of by Franklin.

Now, what is the remedy? What is the best course to follow in this matter? We will discuss this phase in future articles under the heading of: "The Cost of Doing Business."

We would like to have the opinions of a few more of our readers and beg to thank those who have so ably responded to the articles already published.

COST SYSTEM IS IMPORTANT

The importance of a correct cost system is one which is commanding attention at present all over the world.

In fact it is being generally recognized that the success of a business depends greatly upon accurate bookkeeping and true knowledge of what constitutes cost of doing business, which is in other words overhead expenses.

Data Relating to Heating Systems

The Time to Study Heating Systems and Their Requirements is When Such Installations Are Being Installed—Many a Splendid System When Being Installed, Has Been Ruined for Want of a Little Thought.

By T. W. Reynolds.

Warm Air Gravity System

The warm air gravity system of furnace heating (Fig. 12) is cheaper in first cost than other methods of modern heating, it has therefore come into wider use as a convenient method for warming residences. First cost, combined ventilation with heating, and quick response to varying changes in outside temperature make this system popular. On the other hand the circulation of outside air increases the operating cost while the joints at the furnace must be well made to avoid contaminating the air supply with fuel gases.

If properly designed and carefully installed, a warm air furnace system should give as good results as may be desired. It is somewhat more difficult to distribute heated air by the furnace method to the windward side of the house than with the other systems, but

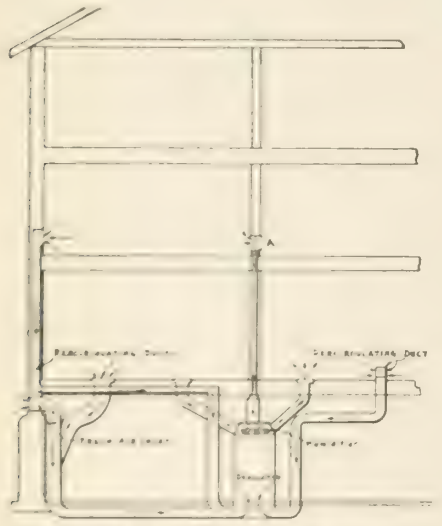

FIG. 12. WARM AIR GRAVITY SYSTEM.

the combined system of warm air and hot water heating, shown in Fig. 13, will to a large extent overcome this disadvantage.

Essentials of Warm Air Heating

In addition to careful workmanship, there are several essential features in warm air heating which serve to establish a successful method. The ducts leading to the rooms should be pitched upward as rapidly as possible; they should have easy or long sweep elbows, and should lead as directly as possible to the rooms to be heated. Friction in air pipes is a much more noticeable factor than friction in hot water or steam pipes, for the motive power depends only upon the difference in weight of two columns of air, one hot and the other cold. Care must, therefore be taken to make all conductor pipes as short as possible, while at the same time they must carry heated air to the cold sections of the rooms. A humidifier which will automatically maintain a relative humidity of 50 per cent. in the heated rooms should be installed as a part of the apparatus. Owing to the high temperature to which the air is heated in the furnace before entering the room, its capacity to rapidly absorb moisture from the body or woodwork is so greatly increased that provision should be made whereby this dry air can be automatically supplied with enough moisture to raise its relative humidity to 50 per cent. or 55 per cent. at the room temperature.

It is sometimes desirable to use a single riser duct to supply two rooms when one room is directly above another. A special register B (Fig. 13), may be used in such a case. A damper in this first floor opening which is controlled by a lever projecting from the register face controls the amount of air passing to the upper and lower rooms.

Warm Air and Hot Water Combination

In the combined warm air and hot water system (Fig. 13), a small cast iron heater A (which serves as the hot water generator), is placed in the upper dome of the fire pot of the furnace. Using this heater as a substitute for the hot water boiler, any system of hot water heating which has been previously described may be used in the residence. Often the hot water generator used in the fire pot of the furnace is made too small to properly heat the water.

The radiators used may be of the indirect, direct or direct-indirect type, depending upon the conditions of the building; the degree of ventilation to be supplied, etc. The same methods of piping as given for the hot water systems previously described must be followed. The installation must also be so arranged that hot air will be supplied by the furnace through the shorter runs to the lower floors, while hot water will circulate to the upper or farthest rooms.

The average residence loses and gains enough air through leakage in the walls, windows, doors, and through the action of stoves or fire-places to supply adequate ventilation in warm weather. It is evident therefore, that the air should be recirculated in residences instead of thrown out through foul air ducts, a large amount of heat being thereby wasted.

The air leakage through the walls, however, does not take place very rapidly when the difference in temperature between inside and outside is small. It seems essential, therefore, that a duct leading from the outside to the base of the furnace should be installed and a series of simple dampers, C (Fig. 13).

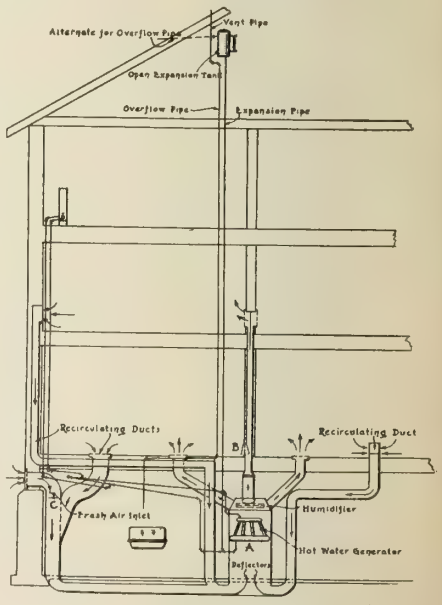

FIG. 13. COMBINATION WARM AIR AND HOT WATER SYSTEM.

placed in the ducts to control the quantity of fresh outside air admitted, and the quantity of air which is recirculated. This fresh air opening should always be placed on the side of the house toward the prevailing wind, or two openings may be installed, one on each of two sides of the house and either one used at will in accordance with the prevailing winds.

Humidity and Its Importance

I. Physical Properties of Air and Moisture (Humidity)—II. Instruments for Measuring Humidity—III. The Effect of Humidity on Health and Comfort—IV. Apparatus for Artificially Increasing Humidity in the Air.

By Consulting Sanitary Engineer.

ARTICLE 2.

III.—The Effect of Humidity on Health and Comfort

"THE question of humidity is perhaps the most important one which remains to be solved before the practice of ventilation can be placed on a sure basis. A lack of humidity, as Professor Phelps has pointed out, makes hot air feel cooler and cold air feel warmer. Extreme dryness per se, however, at high or moderate temperatures is believed by many to be in itself harmful, conducing to nervousness and restlessness and producing injurious effects upon the membranes of the nose and throat."—C. E. A. Winslow in *Science*, April 30th, 1915.

To understand the effect of moisture in the air on the human body some facts in physiology are here reviewed. The human body has naturally and ordinarily a temperature of about 98½ degrees Fahr. The necessary heat is formed by the slow combustion in the body of the carbon from the food. The loss of this body temperature is responsible for the sensation of cold rather than the withdrawal of heat from the surrounding air. The body normally loses heat at an estimated rate of 400 British thermal units (B.T.U.) per hour and, therefore, in a day the loss of heat is greater than that given out by the burning of one pound of coal (average value 8,000 B.T.U.). From 85 to 90 per cent., of the heat loss is through the skin, and is lost by radiation, conduction and evaporation. Normally the loss by conduction is 31 per cent., and by evaporation is estimated at 21 per cent. of the heat lost, the amount of water evaporated in such cases being about two pints per person per day.

At 66 degrees Fahr. there is an equal circulation of blood in the skin and internal organs. Above 70 degrees Fahr. a person may begin to perspire. At 60 degrees Fahr. and below the vessels of the skin become so contracted with cold that only a small amount of blood flows in them. The extra flow of blood in the internal organs necessary to keep up the body temperature to 98 degrees Fahr. may result in serious congestions of vital parts. Over 60 degrees Fahr. and under 70 degrees Fahr. is, therefore, the range of indoor temperature best suited to health, and the one in which nature has provided we should feel, under ordinary conditions, most comfortable.

Humidity or the amount of moisture in the air has a direct effect on the body heat. Moist air conducts heat from the skin more readily than dry air, though this is only noticeable when the air is considerably lower in temperature than the body. On the other hand, moist air prevents the loss of heat by evaporation from the skin when at temperatures over 70 degrees Fahr. evaporation could ordinarily take place. "Therefore, a high percentage of humidity makes us feel warmer on a warm day and cooler on a cool day because in the former case it interferes with the evaporation of the perspiration from the body, while in the latter instance the heat is conveyed more rapidly from the body, causing a sense of coolness." In the winter a room temperature of 65 degrees Fahr. will be found quite chilly if the relative humidity is as high as 75 per cent.

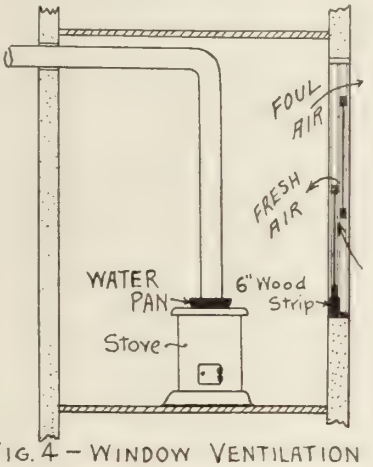

FIG. 4—WINDOW VENTILATION

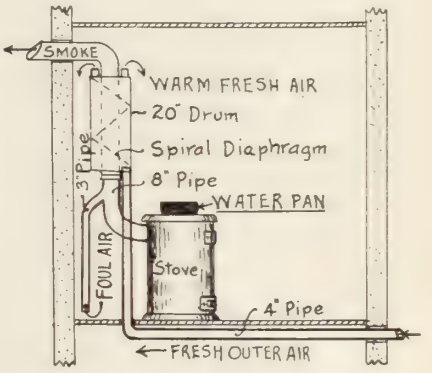

FIG. 5—HEATING, VENTILATING AND HUMIDIFYING

Dry air is not a good conductor of heat, but readily permits evaporation from the body. "Therefore, a low percentage of humidity makes us feel cooler on a warm day and warmer on a cool day." If not too low, a low percentage of humidity, therefore, makes life in the open more agreeable. However, the effect of low humidity on house heating in winter is to cause the body to feel cold even in a comparatively warm room. The dry air produces a rapid evaporation from the body requiring heat, and this heat is taken from the body, producing a sensation of cold. Dry air at 75 degrees Fahr. may seem colder than air at 65 degrees Fahr., having a suitable amount of moisture; and at 65 degrees Fahr. air in a room may seem quite chilly if the relative humidity is as low as 30 per cent.

By comparison it will be seen that the effect of 75 per cent. humidity is to make a room at 75 degrees Fahr. seem chilly, and though for different reasons that the effect of 30 per cent. humidity is exactly the same. It has been found that in both these cases the air should be heated to at least 75 degrees Fahr. for comfort, unless the relative humidity is changed. What, then, is the percentage of relative humidity required to reduce the temperature from the unhealthy one of 75 degrees Fahr. to one between 60 and 70 degrees Fahr.? Tests have apparently shown that with a relative humidity of 50 per cent. the temperature need not be greater than 65 degrees Fahr. for comfort. Advisable temperatures and humidities for indoor heating and ventilating as given by different American authorities are as follows:—

Temperature	Relative Humidity
68° Fahr.	50%
60°–65° Fahr.	60%
65°–68° Fahr.	50%–70%
May or June Day.	
65°–68° Fahr.	60%

In heating and ventilating design one is seldom confronted with the problem of too great a percentage of humidity; when cold outside air is heated to indoor temperature its capacity for moisture is so enormously increased that the resulting relative humidity is always very low. "The colder the weather outdoors the less the humidity indoors." The air in an average house heated by steam or hot water to 72 degrees Fahr. has a relative humidity of less than 30 per cent. If heated by a hot air furnace, observations show it is frequently only 25 per cent. or lower, which is less than the

humidity of an arid desert atmosphere.

Besides the effect of a low percentage of humidity on comfort and body temperature above referred to, there are other inimical results of dry air at room temperature. Cracks in woodwork and the checking of furniture are caused by the dry air drawing out particles of moisture. Authorities are agreed that the delicate membranes of the nose, throat and lungs are irritated and injuriously affected by a dry, hot atmosphere. This is a matter upon which each one has no doubt had some unpleasant experience, such as spending some time in a dry, overheated room, and then stepping outside to a temperature of 0 degrees Fahr. or less on a moist raw night. Nose, throat, and lungs are then just in such a condition that their resistance to bacterial attack is almost gone. If not taken down with cold, catarrh, bronchitis, pneumonia, etc., one may be thankful that he for once dodged the army of microbes awaiting not only outside, but frequently "inside" (as, for example, pneumonia cocci, nearly always present in the throat).

Besides discomfort, injury to woodwork, danger to health, a low percentage of humidity generally results in a lavish use of fuel in an endeavor to keep warm. With a humidity of 25 per cent., a temperature of at least 75 degrees Fahr. is needed to make one feel as warm as at a temperature of 65 degrees Fahr. with 50 per cent. humidity. To retain the heat at this 10 degrees higher temperature will increase the coal bills from 15 to 25 per cent. for an average Canadian winter. Surely this last argument with the price of coal rising is unanswerable. But, again, the higher the temperature of the air the more it expands, and consequently the smaller the amount of life-giving oxygen per cubic foot. And, further, the higher temperature is more suited to objectionable bacterial growths.

The necessity for some means of humidifying the air must be readily conceded.

IV.—Apparatus for Artificially Increasing Humidity in the Air

While the means of heating our homes have been made well-nigh perfect from a mechanical standpoint, but little attention has been given to the problem of providing the average small house with proper means for making the air healthfully moist.

In the old days a pan or kettle of water on each stove in the house provided a ready means of increasing the humidity (see Fig. 4). The water being at high or boiling temperature, water vapor was readily given off. The many advantages of modern house heating appliances are unfortunately greatly offset by their failure to provide a sufficient amount of moisture.

Where stoves are still used as a means of heating, water pans should be provided as shown in Figs. 4 and 5, which diagrams are taken from a pamphlet published by the Canadian Association for the Prevention of Tuberculosis, and entitled "Simple Methods of House Ventilation in Winter." The question of ventilation is, of course, equally important, and should be associated with or rather includes that of a proper amount of humidity. According to the pamphlet, Fig. 4 "shows a simple method of window ventilation where the outer air passes upward and inward between the sashes to replace the air outgoing above the lowered sash. This method may be improved by placing a screen of cotton in the space made by the lowered sash. Recent extended experiments have shown that it is practical, even in cold weather, to place a screen made of a well stretched piece of cotton on a frame inside the upper window sash which has been drawn down, and thus supply a steady interchange of outer and inner air through a substance which transfers much less heat from the room than the glass surface does." The simple and economical method shown in Fig. 5 is said to be extremely satisfactory in houses heated with stoves and does much the same work as the ordinary hot-air furnace. When slipped on to the stove pipe the drum can be supported by a bracket. The spiral diaphragm by causing circulation around the stove pipe insures that the fresh air is warmed before entering room. The foul air being drawn from near the floor, the result is an even temperature throughout the room. The water pan on the top of the stove is a more positive means of humidifying the air than the water pans provided in the average furnace.

For large buildings scientifically ventilated, means for humidifying the air are provided. Devices for accomplishing this vary greatly in design and construction, but usually operate under conditions where the water vapor will be carried into the rooms by the air currents used in their ventilation. Water is best added by passing air through sprays of water or by injecting steam into the entering air currents. Mere wetting with water does not increase the humidity of the air; only water that is added in the form of vapor or steam is of any use.

Air washers are commonly used for humidifying and also at the same time removing dirt and dust particles from the entering air. But air washers of a standard type require 8 feet in length for the apparatus, are expensive and for other reasons as well are not adapted for small houses.

What, then, of the thousands of homes in which the stove heater with its pan or kettle of water has been replaced by the more modern hot air furnace or steam or hot water system of heating? As ordinarily designed there is no provision whatever made in hot water or steam heating for humidifying the air. Nor in the average house is any attempt at systematic ventilation made. The result as previously stated is that the humidity is generally below 30 per cent.—at least 20 per cent. too low for health and comfort.

Pick up a hot air furnace catalogue or leaflet and some such statement as this may be seen, "With every furnace is furnished a water pan of the proper size required to provide the right degree of humidity or moisture in the air of each room." In the experience of the writer, this statement has never been verified by facts. Test any house heated by a hot air furnace and the relative humidity under usual conditions in the winter will seldom be found more than 25 per cent. In some furnaces, of course, better provision than in others is made for evaporating the water from pans or channels located in the furnace. But water vapor evaporated under such conditions is never sufficient in quantity. How much water does a furnace water pan hold? How often has it to be filled? Is it ever allowed to go dry? Compare the answer to such questions with the fact that in winter over 10 gallons of water per day should be evaporated in a small house to give a humidity approaching that necessary for health and comfort.

(Continued in next issue).

LESS BUSINESS FAILURES

There would be far fewer business failures if there was a co-operative effort to deal with the problem by increasing efficiency and eliminating unintelligent competition. The obvious remedy is in the direction of some standard practical system of accounting to counteract the destructive competition that is so manifest in many of our industries to-day. It is of the first importance to the manufacturers of an industry that they agree on the elements or fundamentals of a cost practice, especially to make sure that all the elements of cost are included in their calculations. The statement of cost should include an adequate provision for depreciation and every expense, no matter how trivial it may appear, incurred during the year. The test of the accuracy of a cost system is that it dovetails and co-ordinates with the financial books of account. The cost, then, in the aggregate must be correct.

THE SANITARY ENGINEER

PUBLISHED ON THE FIRST AND FIFTEENTH OF EACH MONTH.

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VOL. X. NOVEMBER 15, 1916 No. 22

LOOKING AHEAD

WELL, what will happen after the war in the sanitary and heating business? Will our journeymen that return just fall back into their every day occupation? Will they ever come back even if they are able to do so?

The above and many other questions of like nature arise. What reply are we to give?

Such questions no doubt are very hard to answer with any degree of surety. But we do not need to meet trouble half way, we should rather be preparing for the most likely things that may happen. Things which we almost know will come to pass.

One result will no doubt be, that a large number of men will have taken such a liking to the open, the free country air that they will not easily take to city life again. These men with families who left our cities will become farmers, not of course those of our own trade in particular, but most men. These men and their families will have been accustomed to city conveniences and they will want them on the farms they take up, and here is at least one good opportunity for business.

Our journeymen will be more reconciled with work in the country, they will prefer the work there to city work. In any case this country will need few large buildings for many years to come in our cities. Big warehouses, big apartment houses and offices buildings should not be countenanced until all vacant property is absorbed. In every large centre there are millions of square feet of floor area vacant at this present time and money invested in superfluous floor space, big buildings not in actual need, will be so much money taken from more serviceable requirements. There should be some method of conserving our wealth and not investing it for mere personal gain.

After the war we should and can be just as patriotic, by building up our country towns a little. "More big villages and fewer big cities" is far more important than extension of water works, drainage schemes, etc., and our duty as sanitary and heating engineers is to be ready for country work.

SEWAGE DISPOSAL QUESTION

FROM time to time information is asked for regarding the law relating to the disposal of sewage. An article will appear in the next issue which will show exactly how this question stands. One of our readers asks us if the law in Ontario will permit of sewage being discharged into a near-by creek or stream. Another says he cannot see why a farmer cannot use such a stream when our towns and cities are practically doing the same. He cites the City of Ottawa as merely using the Ottawa river as he wishes to do when we informed him that the law is opposed to such a condition—not only the law of the land, but the natural law too.

We are living in an age of progress. We know more of the cause of our sickness. We know how certain diseases are first generated, and how to prevent them and should not be too anxious about "the law" which, sad to say, is very seldom enforced. Why build machinery and not work it, or provide men to put it into operation? Why have a board of health that has to be forced into action by the press or public opinion? That is just what is being done to-day. The Health Act of Ontario is about as nearly perfect in both letter and spirit as it can be, but it is like a still engine, it needs an engineer, it needs lubricating and setting in motion.

In the next issue we will publish a part of what would take the place of a plumbing by-law, and show how easily the Ontario sanitary engineers could put this health act into operation, all that is needed is a few volunteers. A few men who are ready to carry out this health act voluntarily, and the time would not be long before every little hamlet and every house in that locality would attach greater value to sanitary appliances and the trade who install such fixtures.

EXAMINATIONS FOR APPRENTICES.

THE members of the Toronto Society of Domestic Sanitary and Heating Engineers are again trying to improve the conditions of the trade and the lot of those who labor in their line.

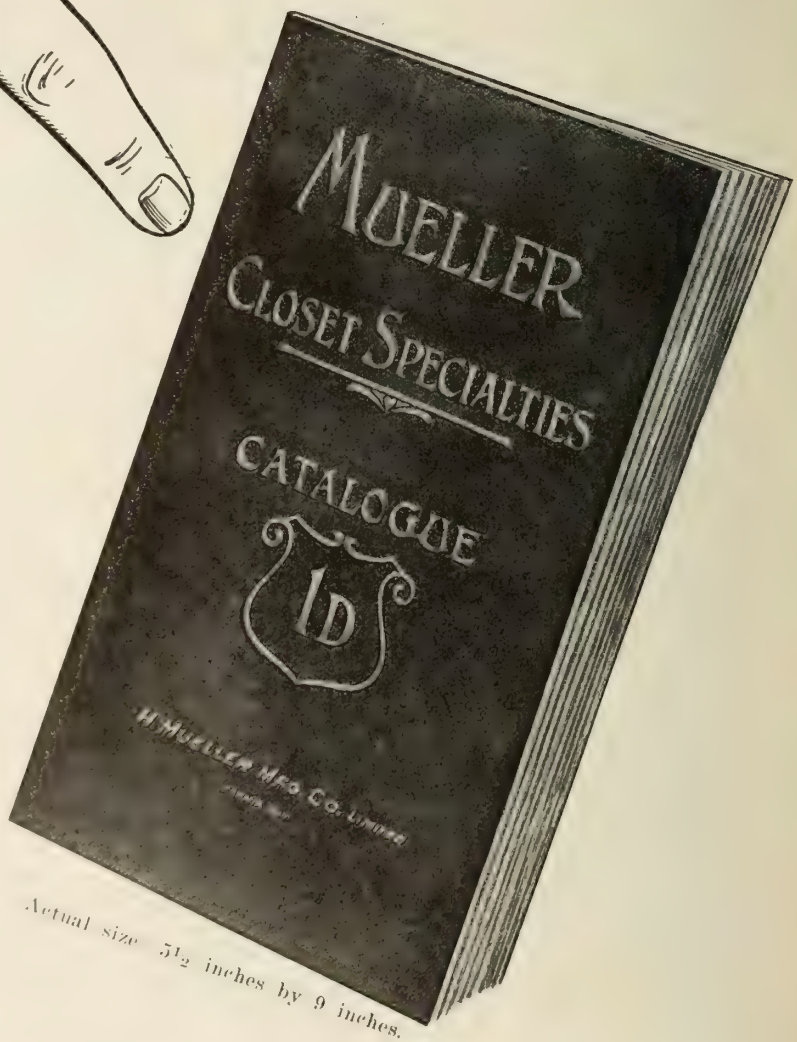
A board of examiners has been formed which comprises two journeymen sanitary engineers, two journeymen heating engineers and three employers. These men will meet at stated periods and put through an examination, those apprentices employed in the various shops, thus testing their practical efficiency, and only those boys who prove by diligent study that they are likely to become efficient workmen in due course will be allowed to work at the trade.

The movement is in no way arbitrary, but is rather with the idea of creating more efficient craftsmen in the days to come.

Further particulars regarding the scheme is described on page 32 of this issue.

IF our Catalogue 1D is not in your stock of reference books, you lack some very useful information.

It's Yours for the Asking



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On the opposite page we show two of the illustrations that appear in this catalogue.

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H. Mueller Manufacturing Company, Limited

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"ARMCO" Iron Tanks

Not only is the Metal the finest and most durable that can be made for the purpose.

But it is enameled with the best porcelain enamel known to the *scientific world.*

Both of these features go to make up the best and most scientific Anti-sweat tank on the Market.

It would never do for us to try and sell any line that is not the BEST and our experience proves that Enameled "Armco" Tanks have no competitor.

It's an *all-white* tank, with an *all-white* reputation for *Durability and Lasting Service.*

FULLY WARRANTED

The fittings in all of our tanks are the "Hydraulic" Flush Valve and the "Rapidac" Ball cock and they stand in a class by themselves.

H. MUELLER MFG. CO., Limited, Sarnia, Ont., Canada

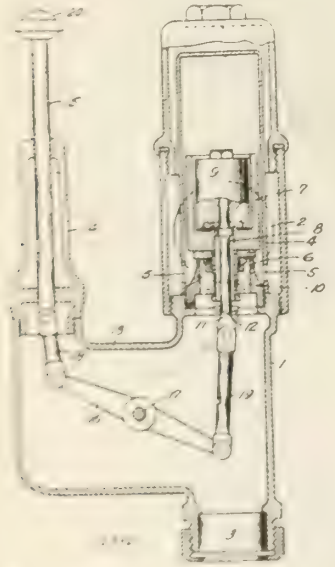
Makers of High-Grade Water, Plumbing and Gas Brass Goods, and Jobbers of General Plumbing Supplies

New Canadian Patents

No. 169,966.

The James Robertson Company, Limited, assignee of Joseph Mattinson, both of Montreal, Quebec, Canada, 6th June, 1916; 6 years. Filed 4th March, 1915. Receipt No. 248,727.

Claim.—In a device of the character described, the combination with a tank, of an outlet nipple therefor having a hollow extension, a tank overflow pipe secured to said extension, a seat at the top of said nipple, a cylindrical casing closed at its upper end, a buckle connecting the casing and nipple having lateral apertures therein above the nipple seat, a tubular valve having the bore thereof shouldered loosely fitting in the buckle casing resting on said nipple seat, a seat on the shoulder of the valve bore, an unloading valve on said valve seat, a washer on said unloading valve holding said washer in position and projecting through the valve bore, lugs on said post engageable with the valve upon the rise of said unloading valve from its seat, and an operating spindle connected to the unloading valve passing out through the closed top of the casing, arranged for co-operation with the trip device of the tank.



No. 169,967. Flushometer.

No. 169,967.

The James Robertson Company, Limited, assignee of Joseph Mattinson, both of Montreal, Quebec, and Robert J. East, Winnipeg, Manitoba, all in Canada, 6th June, 1916; 6 years. Filed 4th March, 1915. Receipt No. 248,726.

Claim.—In a device of the character described, a casing having a lateral extension in its lower portion, an inlet above said lateral extension, a valve seat, a valve thereon, a hood over said valve having apertures in the wall thereof below the seat level and in line with the bottom of the inlet, a guide projecting upwardly from the casing extension to a point above the inlet, a spindle freely movable in said guide and engaging from the guide at a point considerably above said inlet, valve seat and hood apertures, a rocking lever journalled intermediate its ends in sand extension, and links connectig the ends of said lever respectively to the valve and spindle.

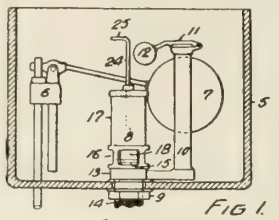


FIG 1.

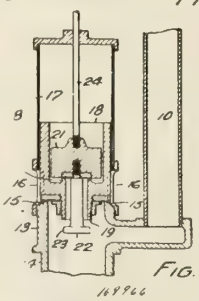


FIG. 2.

169966

. 169,966. Flushometer.

No. 169,995.

David William Allman, Toronto, Ontario, Canada, 6th June, 1916; 6 years. Filed 30th November, 1915. Receipt No. 258,530.

Claim.—1. A water heater comprising a boiler, a heater arranged beneath the boiler, a supreheater having a hot water discharge at the top, the water supply to said superheater entering at the bottom and leading from the top of the boiler, means for effecting the circulation of water to the boiler, means for effecting the circulation of water to the boiler through the superheater, and means for circulating the water in the boiler independent of the superheater circulation.

2. A water heater comprising a boiler, a heater arranged beneath the boiler, a superheater having a hot water discharge at the top, a pipe leading from the top of the boiler to the bottom of the superheater, means connecting the superheater discharge to the superheater supply, a check valve interposed in said means to prevent the drawing of water from the superheater supply, means connecting the superheater supply with the bottom of the boiler, and a check valve in the latter means to prevent the outward flow of water from the bottom of the boiler.

3. A water heater comprising a vertical fire tube boiler, a heater arranged beneath the boiler, a superheater comprising a plurality of tubes of smaller diameter than the boiler tubes extending vertically therethrough and connected by headers at the top and bottom, a draw-off pipe leading from the top of the superheater, a pipe leading from the top of the boiler and connected with the draw-off pipe, a check valve arranged between said draw-off pipe and the boiler to allow inflow to the boiler and check outflow, a pipe connecting the pipe leading from the top of the boiler with the bottom of the superheater, a pipe connecting the latter pipe with the bottom of the boiler, and a check valve arranged in the latter pipe allowing inflow to the boiler and preventing outflow.

4. In a gas water heater, a boiler, a gas burner arranged beneath said boiler, a flue leading from above the top of said boiler, means for controlling the lighting and extinguishing of said burner, a damper in the flue, and means operated by said controlling means for operating the damper to open the flue on the lighting of said burner and to close the flue on the extinguishing of the burner.

5. In a gas water heater, a boiler, a gas burner arranged beneath said boiler, a valve controlling the supply of gas to the burner, a suspended fluid container operatively connected with said valve and adapted upon receiving a predetermined quantity of fluid to open the gas valve, means for discharging the fluid from said container, and counterbalancing means connected with said container for effecting the closing of the gas valve upon the discharge of said fluid.

6. In a gas water heater, a boiler, a gas burner arranged beneath said boiler.

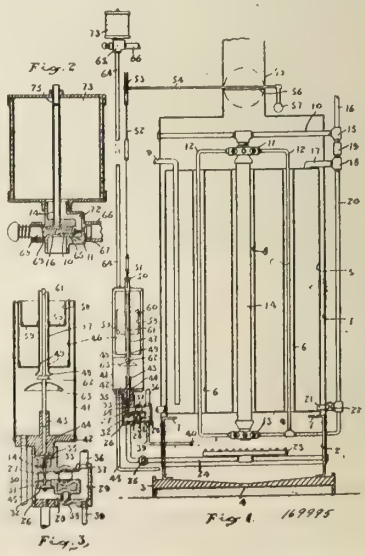


Fig. 2

Fig. 1. 169995

Fig. 3

No. 169,995. Gas Water Heater.

a valve controlling the supply of gas to the burner, a suspended fluid container operatively connected with said valve and adapted upon receiving a predetermined quantity of fluid to open the gas valve, means for discharging the fluid from said container, counterbalancing means connected with said container for effecting the closing of the gas valve upon the discharge of said fluid, and means for supplying fluid to the container.

7. In a gas water heater, a boiler, a gas burner arranged beneath said boiler, a valve controlling the supply of gas to the burner, a suspended fluid container having an opening in the bottom, a valve carried by said container adapted on the depression of the container to open gas valve, a valve adapted to regulate the flow of fluid from the opening in the container, means for adjusting said valve, counterbalancing means supporting said container and adapted on the discharge of the fluid therefrom to effect the closing of the gas valve, and means for supplying fluid to the container.

8. In a gas water heater, a boiler, a gas burner arranged beneath said boiler, a valve controlling the supply of gas to the burner, a suspended fluid container operatively connected with said valve and adapted upon receiving a predetermined quantity of fluid to open the gas valve, means for discharging the fluid from said container, a flue leading from the top of the boiler, a damper in said flue, suspension means for supporting said container from said flue, and a counterbalance connected with said damper to close the flue and to raise the fluid container and effect the closing of the gas valve.

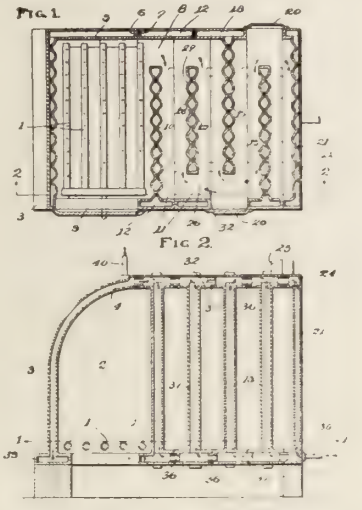
9. In a gas water heater, a boiler, a gas burner arranged beneath said boiler, a valve controlling the supply of gas to the burner, a casing arranged above said gas valve, a fluid container suspended in said casing and having an open-ended tube extending perpendicularly therethrough, said tube having openings at the bottom leading from the container, an inner container rigidly supported on said tube intermediate of its length and having openings in the bottom, a rod loosely supported in said tube and adapted to operate said gas valve, a valve on said rod adapted to regulate the size of the opening from the lower end of the tube, means for regulating the upward movement of said valve rod, counterbalancing means supporting said flue container and adapted to raise same at a predetermined period according to the quantity of fluid in the container, means for supplying fluid to the container, and means for discharging the fluid from said casing.

10. In a gas water heater, a boiler, a gas burner arranged beneath said boiler, a valve controlling the supply of gas to the burner, a suspended fluid container operatively connected with said valve and adapted upon receiving a predetermined quantity of fluid to open the gas valve, means for discharging the fluid from said container, counterbalancing means connected with said container for effecting the closing of the gas valve upon the discharge of said fluid, a tube discharging into said container, a gauge casing arranged at the upper end of said tube, a fluid supply leading to said casing, and a valve adapted to control the supply of fluid to said gauge casing and to direct the fluid therefrom into the tube leading to said container.

No. 169,987.

Louis Lawrence Gorr and Abram Leman Houseworth, assignee, of a half interest, both of Marshfield, Oregon, U.S.A., 6th June, 1916; 6 years. Filed 27th March, 1916. Receipt No. 263,474.

Claim.—1. A fluid heater composed of a plurality of detachably connected units, each of said units being constructed of sheet metal and having hollow walls for retaining fluid to be heated.



No. 169,987. Fluid Heater.

2. A fluid heater composed of a plurality of detachably connected units, each of said units being constructed of sheet metal and having hollow walls for retaining a fluid to be heated, one of said units forming a combustion chamber at one end of the fluid heater, a unit at the opposite end of the fluid heater from said last-mentioned unit being provided with an outlet for waste gases, a fluid inlet communicating with the last-named unit, and a fluid outlet communicating with the unit forming the combustion chamber.

3. In a fluid heater, a unit forming a combustion chamber and having the upper portion thereof curved, a burner positioned within said combustion chamber beneath said curved portion, a plurality of units detachably connected to said first-named unit and to each other, the unit remote from said first-named unit having an outlet formed therein for the escape of waste gases, whereby the waste gases will pass through all of the units upon its travel from the combustion chamber to its outlet, said units having hollow walls for retaining the fluid to be heated, a fluid inlet formed upon said remote unit, and a fluid outlet formed upon the curved portion of said combustion chamber unit.

4. In a fluid heater, a unit forming a combustion chamber and having its upper portion curved, a burner positioned within the combustion chamber beneath said curved portion, a plurality of units detachably connected to said first-named unit and to each other, the unit remote from said first-named unit having an outlet formed therein for the escape of waste gases, whereby the waste gases will pass through all of the units upon its passage from the combustion to its outlet, said units having hollow walls for retaining a fluid to be heated, a fluid inlet formed upon said remote unit, and a fluid outlet formed upon the curved portion of said combustion chamber unit.

No. 169,957

Lewis Alonzo Mapel, St. Louis, Missouri, U.S.A., 6th June, 1916; 6 years. Filed 17th April, 1916. Receipt No. 264,000.

Claim.—1. Valve mechanism comprising a tapering valve casing, a tapering valve body mounted in said casing, a removable closure at the larger end of said casing, a tubular extension on said closure, a journal member rigid with the larger end of said valve body journalled in said tubular extension, a valve stem of smaller diameter than said journal member integral therewith, an annular shoulder at the end of said journal member around said valve stem, a ring encircling said valve stem and bearing against said shoulder, packing within said tubular extension bearing against said ring, and a manipulative device operable to impart any desired degree of pressure against said packing and thereby force said valve toward the smaller end of said valve casing by any desired degree of pressure.

2. A device of the character described, comprising a tapering valve casing, a tapering valve body operatively mounted in said casing, a tubular extension of uniform interior diameter throughout at one end of said casing, a journal member rigid with the larger end of said valve body journalled in said tubular extension, a valve stem of smaller diameter than said journal member extending outwardly therefrom, a flat annular shoulder at the union of said journal member and valve stem, a ring encircling said valve stem within said tubular extension and bearing against said shoulder, elastic packing encircling said valve stem within said tubular extension and bearing against said ring, a

(Continued on page 34.)

Rural Sanitation

A Continuation of the Sanitary Science Course That Has Been Appearing in the Sanitary Engineer, But Having Particular Reference to the Sanitary Disposal of Household Wastes in Unsewered Districts.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 14.

"Sanitary Privies"

IN the preceding articles the principles and practice of sewage disposal in unsewered districts have been presented in a general way. The endeavor has been to treat the subject in such a manner that the reader may now be in a position to judge of the merits or at least to follow a criticism of various sewage disposal plants to be described in forthcoming articles.

Numerous bulletins on the subject of the sanitary disposal of sewage in suburban districts and on the farm have been issued by Provincial and State Boards of Health and by various agricultural colleges. These bulletins taken on the whole contain valuable information as to the principles involved and as to the constructional details of small plants. It is proposed to give this information, accompanied with any criticism that may appear necessary or helpful to the reader.

In advance, it might be mentioned that a number of these bulletins are unforunately written in such a way that the reader might get the impression that there is only one way of accomplishing a particular result or results. And the instructions in one bulletin to the effect that a certain thing **must** be done may be flatly contradicted by a **must not** in another bulletin. The fact really is, of course, that the modern theories and practice in regard to sewage disposal in general have been almost continuously altering since the eighties, when the septic tank alone without further treatment was heralded by many as a perfect solution of the sewage disposal problem up till to-day when the theory is that only by complete oxidation (the very opposite of septic action) can sewage be purified. The "activated sludge" process now being experimented with is hoped to be for large plants the practical expression of this latter theory.

Natural laws have not changed from 1881, the date of the invention of Mouras' Scavanger (a septic tank) to 1916, as they were from the time of Moses, an early sanitarian, to the present. But man's interpretation of the facts of nature have all too frequently been at fault. A principle eminently applicable to sewage disposal under some conditions of soil, climate, density of population, etc., has been found not to apply under other conditions. Dogmatic assertion, whether in a bulletin or out of it in regard to any method of sewage disposal, is in the light of history of the past few years rather out of place.

There is, of course, for each condition met one best method of disposing of sewage, the attendant circumstances being fully considered. The function of the engineer is to approximate as nearly as possible to this best way for each condition. If he tries to apply one stereotyped method to every case, then he ceases to be an engineer through "passing up" the right and opportunity of weighing the factors involved, and, further, the result of his work may frequently be the opposite of sanitary. Reading and experience lead one to believe that under average conditions the sub-surface irrigation method of sewage disposal can be made for small plants sanitary, convenient and comparatively inexpensive. For this reason the method has been described at some length in these articles. One soon learns, however, from reading, but more from experience, that there are some conditions under which it will not work satisfactorily without essential modifications. One should be prepared to welcome any new method if it can be shown to be an improvement.

The dry earth closet, shown in a previous article to be sanitary when properly attended to, is probably the most "natural" of any method of sewage disposal. It is a great improvement on the insanitary common "dug" or "pit" privy—insanitary because of the certainty in most cases of polluting near-by water supplies. But, judged according to our present standards of civilization, the dry earth closet is certainly not up-to-date. Its disadvantages and inconveniences, including daily removal of dry earth, are especially noticeable in northern climes.

Various other substitutes for the objectionable dug privy have been proposed under the name of "Sanitary Privies," the object being to combine convenience and sanitation. Though possibly not in themselves of any great interest to the reader, yet for a complete record of what has been done in different parts of North America one or two articles will be devoted to "Sanitary Privies." Some constructional details may appeal to the reader for use in other sewage disposal plants.

Kentucky Sanitary Privy

Of "Sanitary Privies" the above is probably best known. The following is an extract from the rules of the State Board of Health:

"All schools, health resorts, hotels, railway stations, court houses and other places of public resort and use, not connected with an approved system of sewage, shall on or before July 1, 1914, construct privies upon or convenient to their premises, proportioned in size and number to the persons and sex of those likely to use the same, the privies to be located below the level, or draining away from or as remote as possible from the well or spring, and to be modeled after the Kentucky sanitary privy or some other plan approved by the State Board of Health. At least four gallons of water shall be poured through each hole in the seat and the urinal every day, and some reliable person shall be designated and held responsible for this duty and to see that toilet paper is constantly provided, and that the premises are kept scrupulously clean."

Extracts from the Bulletin Issued by the State Board of Kentucky in October, 1913.

"The cuts, Figs. 1, 2 and 3, represent the self-cleaning fly-proof, septic tank privy which, after three years' experimental work, the State Board of Health recommends for all country and town homes, schools, hotels, railway stations, court-houses and other places without sewer connections. The details of construction and management have been worked out with care, and if the plans are strictly adhered to, and the instructions as to daily flushing and rigid cleanliness are carried out, the privy may be placed within ten feet of the house, but never inside it, or on the porch. Toilet and bath rooms from the house may drain into the tank if the pipes are well trapped and extended above the roof for ventilation, but kitchen sinks should never do so, on account of the certainty of the grease clogging the pipes.

"As shown in the cuts, the first or curved joint of the drain should be of glazed tile, and the inner end should go well into the water to make it an effectual trap. As shown in Fig. 3, the drain may extend from the front on either side of the tank as will best suit the lay of the land. The porous farm tile should extend 100 feet, more or less, depending

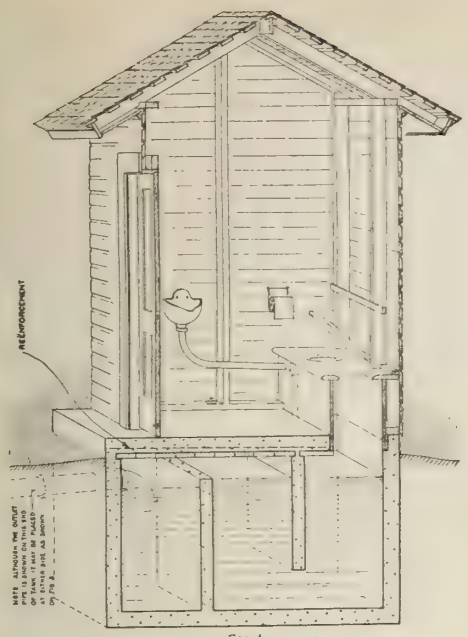


FIG 1
VERTICAL SECTION OF TANK AND HOUSE

KENTUCKY SANITARY PRIVY

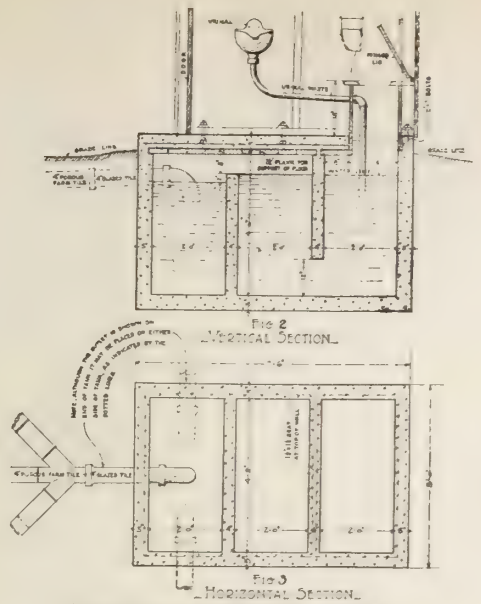


FIG 2
VERTICAL SECTION

FIG 3
HORIZONTAL SECTION

KENTUCKY SANITARY PRIVY

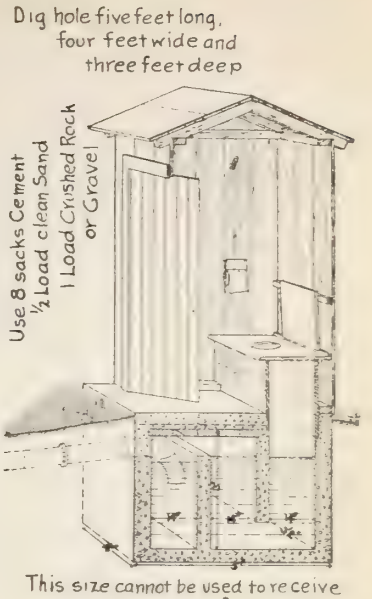

Dig hole five feet long, four feet wide and three feet deep
Use 8 sacks Cement ½ Load clean Sand 1 Load Crushed Rock or Gravel
This size cannot be used to receive wastes from sinks etc from House

FIG. 4—"1916 MODEL" K.S.P.

upon the character of the soil. It should be laid below the frost or freezing line, away from the spring or well, should discharge entirely underground, and the surface over the drains should be utilized for a flower bed or rose garden, getting the benefit of the constant irrigation and fertilization, thus converting into a thing of beauty and pleasure what has always been a malodorous source of danger.

Before the house is put in place and bolted down, the tank should be filled with water, five or six shovelsful of old, well-rotted horse manure should be put in to innoculate the fluid with the liquifying, purifying germs upon which everything depends, a supply of toilet paper should be provided, and the privy is ready for use."

Remarks and Criticisms

Beside the extracts quoted, there are useful directions for the making of forms and the mixing and placing of concrete. Similar instructions can be found in the following bulletins, which can, no doubt, be obtained by writing for them:

"The Use of Concrete on the Farm." Farmers' Bulletin, 461—U. S. Department of Agriculture, Washington.

"Concrete in the Country"—Bulletin No. 26—"The Association of American Portland Cement Manufacturers, Chicago."

"What the Farmer Can Do With Cement"—"The Canada Cement Co., Ltd., Montreal."

From a constructional standpoint it might be pointed out that apparently no provision is made for easy cleaning out of the tanks. Cleaning once a year would no doubt be advisable, but would appear to be difficult in the Kentucky privy.

In comfort and convenience there seems to be no remarkable gain over the common dug privy. Why an indoor water closet is not considered a necessity appears as rather strange to those of us who have studied the question of sewage disposal in northern climes.

But the important point to be considered is the question of sanitation. Is this privy sanitary? There are ordinarily three ways in which human excreta and the frequently attendant disease bacteria, may be spread about:

(1) By the hands or feet of persons and by animals.

(2) By flies and similar insects.

(3) By surface or sub-soil water carriage.

"Probably no people, even among the most barbarous, have persisted in filthier practices in the disposal of their discharges than the inhabitants of unsewered cities, towns and country districts in the United States, including Kentucky, to say nothing of the high sick and death-rate every month in every year from typhoid fever and other unquestionable filth diseases. Forty per cent. of the thousands examined from every section of the State showed infection of some sort, by hook worm or other intestinal parasites, caused only by the pollution of the soil and food from human excrement. In most counties only a small per cent. of either homes or schools have any privies, except such as are intended to hide the body while attention is given to the calls of nature. Such as they have are open to rats, chickens, often to hogs and dogs, and always to the flies, which live on and besmirch their bodies with fecal filth between meals, and on the food, hands and utensils in the unscreened kitchens and dining rooms at meal time. Where there are no privies of any kind, and this is probably true of more than half the dwellings and schools in Kentucky, chimney and fence corners, and the surface of the backyards are used as substitutes by the women and children, the men using the stables or other outbuildings, with the same disgusting relations as to fowls, dogs, rats, flies and food. Often the wells and springs are infected from such sources, frequently the shoes, and indirectly the hands become so, but unquestionably flies are the most common carriers of disease from such places." In view of these conditions described in the bulletin, the Kentucky sanitary privy must be admitted to be a wonderful improvement. But is it entirely sanitary? The danger of carrying disease by animals or flies or surface water is avoided, but only if the effluent from the privy is thoroughly purified can the danger of contamination of water supplies in the vicinity be eliminated.

From one of the extracts quoted above one would gather that the bacterial action in the tank of the Kentucky privy is a purifying one. Under the conditions outlined, however, only septic action can take place. Solid matters will be broken up and reduced, but no oxidation or purification can occur. This is the modern opinion expressed by practically all bacteriologists and chemists.

The only place for the liquid sewage to be purified is in the top soil surrounding the 100 feet or so of drain tile provided. If not purified there, the impure liquid as it seeps away in the lower soils may be "filtered" to some extent, but little further bacterial action can take place in the depths of soil where air is excluded. Fissures in the rock, natural underground channels, etc. (particularly in limestone formations) may allow the

(Continued on page 34.)

PRACTICAL SHEET-METAL WORK

BY THOMAS JANFIELD

Fig. 1 To Trisect a 90 degree Right Angle

LET A-B-C be the right angle to be bisected. Take any point D in B-A and with B as centre and B-D as radius describe a circle cutting B-C at E. Now with E and D as centres, and with the same radius as before, draw two arcs cutting the arc DE as shown at C and F respectively. Then join BG and BF. These lines will trisect the right angle.

Fig. 2. To Construct an Equilateral Triangle on a Given Altitude

Let line X.X. be the given attitude Draw line AB, and from any point in it draw a line DC, at right angles to AB, the same length as the altitude XX. Next draw a straight line EF through C parallel to AB. Now with D as centre and with any radius less than DB, describe a circle cutting AB at G and H. Then with G and H as centres, and with the same radius describe two arcs intersecting the circle at J and K.

Now draw lines from point D to J and K, and produce them till they meet the line EF. The triangle formed by these lines is an equilateral triangle of the required altitude.

Fig. 3 upon a given line, to draw a regular pentagon.

Let line AB be the given line upon which the pentagon is to be described.

With B as centre and AB as radius, draw a circle as shown by A, C, D. Then extend line AB, cutting circle at D. Next bisect line AB at F.

With B as centre and BF as radius draw a circle. Then draw BG at right angles to AB cutting this circle at G. Now with G as centre and GD as radius, draw a circle cutting a continuation of GB at H. With D as centre and DH as radius draw another circle cutting the semi-circle A, C, D at J. Join BJ. BJ is the second side of a regular pentagon.

Now bisect BJ at M, draw ML at right angles to BJ, meeting a line FL drawn at right angles to AB at L. With L as centre, and LB as radius, describe a circle which will also pass through A and J. With A as centre, and AB as radius describe an arc cutting the circle at 2, and with J as centre and JB as radius describe an arc, cutting the circle at 1. The figure 1, 2, A, B, J, is the regular pentagon required.

Fig. 4 to construct a triangle the length of the sides being given.

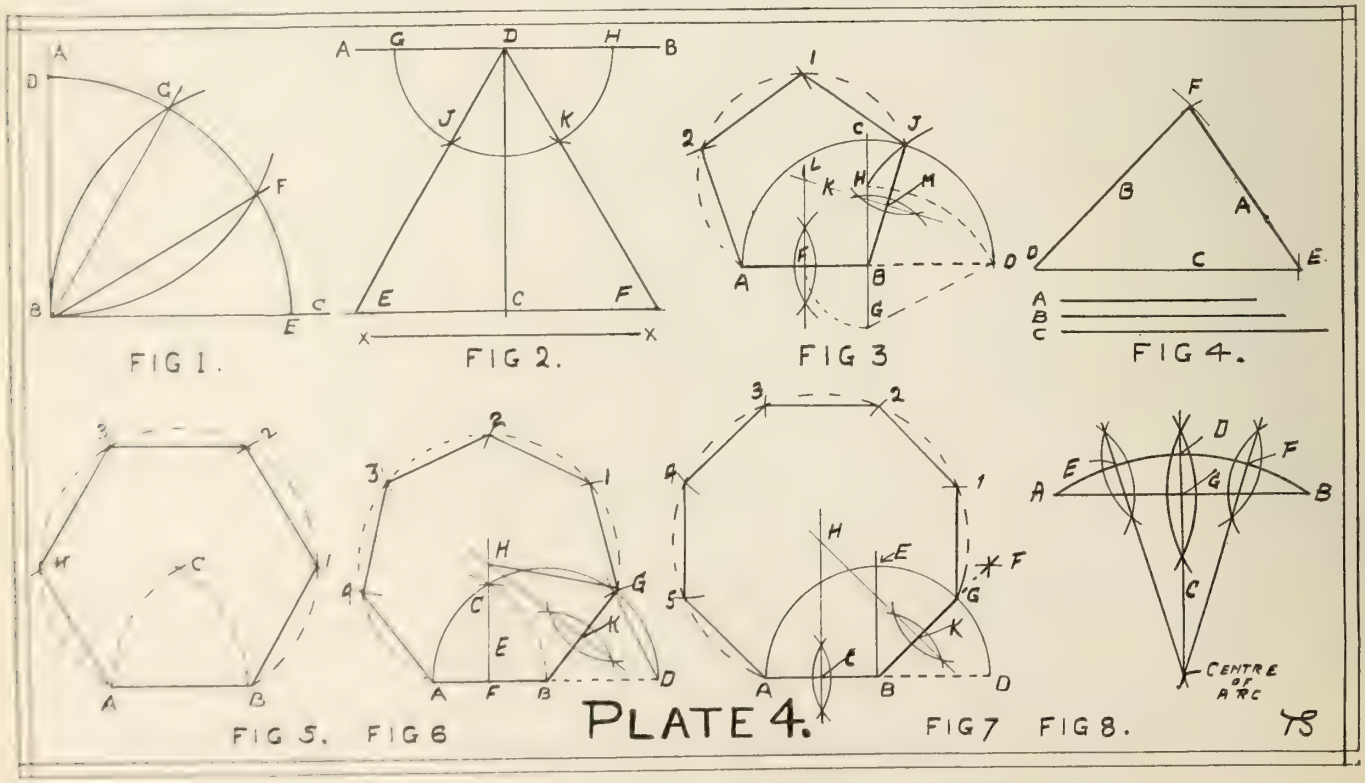
Let A, B, C, be lines of the length of the three sides of the required triangle. Draw the line DE equal in length to C. With D as centre and radius equal to line B, and with E as centre and radius equal to line A describe two circles cutting one another at F.

Then D, F, E, is the triangle required.

Fig. 5. To Draw a Regular Hexagon Upon a Given Line

Let AB be the given line. With B as centre and BA as radius, and with A as centre, and AB as radius draw two arcs intersecting at C. With C as centre, and with radius CA draw a

(Continued on page 37)



Sewage Disposal Law in Ontario

Large Number of Farmers and Rural Residents Installing Sanitary Conveniences, Desire to Know the Law Regarding Disposal of Sewage — Ontario Law is Specific, Only Based Upon Natural Law of Cleanliness

BY ONE OF US.

"I WISH to know whether there is any law in the statutes of Ontario prohibiting a resident of the rural districts from emptying sewage into a creek or similar body of water. The question has arisen in regard to the disposal of sewage on farms. In some cases, a stream of water runs close by the buildings and the question is sometimes asked us if it would be right to run a tile to that stream from the house.

"If there is any information along this line available, I would be pleased to receive it."

Such are the questions which come to us time and again, and on account of the fact that we know there are quite a number of rural residents having plumbing installed in their homes, we wish to draw the matter to the attention of our readers as a matter of more than usual importance. We wish them to take every precaution possible which will reflect credit and not discredit upon themselves and the craft as a whole.

It is our duty to be rather a little ahead of the times than following old obsolete practices which, if not in every case, have, in many instances, proved to be anything but sanitary.

For the sake of argument, let us picture a creek running by one's place. Years ago it was felt to be the most natural means of carrying away anything that could be conveniently discharged into such waters, but such practices never were sanitary, never could be sanitary and never will be.

Cesspools (ceasepools) were and are to-day being used and installed by men who, in many cases, know better. But it is always cost, first cost, not what the cost MAY ultimately be.

And it is to prevent such "pools of filth" being installed that we have sanitary laws compiled, though, sad to say, not enforced as they should be by any means, simply because these laws are in the keeping of a few men who have neither the time nor the will to arouse public sentiment, or educate the public in a sufficient manner against the evils of insanitary methods.

Now, seeing that hundreds of our readers are installing sanitary fixtures and appliances in rural homes, that the very installing of such fixtures implies that sewage will flow from them to "some place," let us as a craft stand for the proper disposal of such sewage demanding that the most sanitary method of sewage disposal be carried out. It need not be the most expensive even at first cost. But it should at least be sanitary.

It may in any case mean that an irresponsible competitor may install a cesspool, or it may be that a rural resident purposes installing a cesspool himself, saying, "Jones installed a cesspool ten years ago and he's had no trouble with it. Why should I install a septic tank and sewage disposal bed?"

To such a query, THE SANITARY ENGINEER would reply:—First, that progress and natural law has proved that cesspools are a filthy contraption, and we sanitary engineers would not be "sanitary engineers" if we were to lend ourselves in any way to the use of cesspools. We should find out where and how sewage is going to be disposed of from the fixtures we install. Not that we desire ourselves to install a septic tank for our customer; he may wish to do that himself or engage another contractor. But we should know, or let the proper authorities know, how such sewage is going to be handled. Apart from it being against the law in Ontario in particular, it is not in the best interests of the human race to say to ourselves, "Well, if they wish to install a cesspool, they can do so; it's none of my business. I've installed the sanitary fixtures in as good a way as possible, and my work ends at the outside of the building." We should not even be satisfied or feel that our duty is ended by warning our customer, but we should do all in our power to prevent him installing any contrivance which we know from practical experience and sound judgment, to be insanitary. Second, we should, particularly those of us who reside in Ontario, know what the Ontario Health Act says about such matters.

The following extracts are taken from

THE PUBLIC HEALTH ACT

(Chap. 58, 2 George V., 1912.)

Depositing Filth, etc., in Provincial Waters

91 (1)—No garbage, excreta, manure, vegetable or animal matter or filth shall be discharged into or be deposited in any of the lakes, rivers, streams, or other waters in Ontario, or on the shores or banks thereof.

Disposal of Offensive Matter on Boats

(2)—The owners and officers of boats and other vessels plying upon any such lake, river, stream, or other water shall so dispose of the garbage, excreta, manure, vegetable, or animal matter or filth upon such boats or vessels as not to create a nuisance or enter or pollute such lake, river, stream or other water.

Residents of Summer Resorts

Residents of a health resort or summer resort shall so dispose of garbage, excreta, manure, vegetable, or animal matter, or filth as not to create a nuisance, or permit it its gaining entrance to or polluting any such lake, river, stream or other water.

Penalty

(4)—Any person who contravenes any of the provisions of this section shall incur a penalty not exceeding $100. (See 6 Edw. VII., c. 19, s. 32.)

Returns from Waterworks

92. Water boards, water companies, water commissioners, and the proper officers of any municipal corporation making use as a source of water supply of any well or any other source within or partly within Ontario, and distributing the waters thereof for public, domestic, or general uses, shall, from time to time, and whenever required by the Provincial Board, make returns to the Board upon forms to be furnished by it of such matters as may be required by the Board and called for by such forms, and any such water board, water company, water commissioner or officer who shall, for the space of thirty days after being furnished with such forms, fail or neglect to make any such reports required shall incur a penalty of $100. (New).

Polluting Water Supply

93.—(1)—No sewage, drainage, domestic or factory refuse, excremental or other polluting matter of any kind, which, either by itself or in connection with other matter corrupts or impairs or may corrupt or impair the quality of the water of any source of public water supply for domestic use in any municipality, or which renders or may render such water injurious to health, shall be placed in or discharged into the waters, or placed or deposited upon the ice of any such source of water supply, or be placed or suffer to remain upon the bank supply, near the place from which the supply of water for domestic use is obtained, nor within such distance thereof as may be considered unsafe by the Provincial Board, after an examination

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Market Conditions and Tendencies

Statements Regarding the Prices and Tr end of Supplies.

THE MARKETS AT A GLANCE

THE COST of supplies continues to soar. Prices have advanced on range boilers, lapweld pipe, cotton waste, galvanized sheets, nails, pig iron and other lines. Manufacturers of some products have withdrawn prices and will only quote on application. All ingot metals remain firm in price, and in heavy demand. There is no reason to expect lower prices for at least some time to come. Further advances are expected on many of the miscellaneous products used more or less by the plumbing trades. There has of late been considerable improvement in demands from industrial centres where additions are being made to manufacturing plants. Country trade continues fairly brisk.

TORONTO, Nov. 13.—The trend of prices is still upwards, and the quotations on most lines continue firm. A large number of price changes have taken place since the previous issue of this paper. Some of the changes affect products used in large quantities by sanitary engineers, while others are used in similar quantities. Manufacturers of some lines, such as gas water heaters, storage systems, etc., have withdrawn their prices and quote only on application.

Big Demand for Valves Indicates Development

VALVES.—During the past two weeks there has been a good demand for valves of all kinds. Large dealers in these commodities state they are going principally into industrial buildings. Valves and taps for the building of houses are having a rather light run, but the kind used in factory buildings are stated to be in good demand. The market is firm in these commodities at the advances recorded in last issue. There seems to be small possibility of reduction in the face of the high price now commanded for brass and copper of all kinds. Dealers look forward to present prices holding steady at least for some time. They state frankly they do not look for lower prices in the face of conditions.

Following are discounts quoted on the various classes of valves:—

	Per Cent.
Ground work	50
Compression work, standard	60
High grade	53
[illegible]	45
[illegible] standard	59
[illegible] grade	52
Basin cocks No. 0, standard	58
High grade	52
No. 1 and 2, standard	54
High grade	46
Bath cocks	60
Flatway stop and waste cocks, standard	58
High grade	35
Roundway stop and waste cocks, standard	58
High grade	55
Steam cocks	65
Globe, angle, and check valves, standard	35
High grade	30
Radiator valves, standard	45
High grade	35
Patent quick opening valves	65

Soil Pipe and Fittings Hold at Recent Advances

PIPE AND FITTINGS.—The market for soil pipe and fittings has remained steady during the period since last quotations. The demand is reported light.

Following are the quotations on pipe and fittings:—

	Per Cent.
Medium and extra heavy pipe up to and including 6 in.	60
8-inch soil pipe	45
Medium and extra heavy fittings up to and including 6 in.	65

Lapweld Pipe Has Again Advanced

WROUGHT PIPE.—Considerable advances have been recorded in the price of lapweld and buttweld pipe in all its various grades, as announced by new lists that have been issued during the week.

Following are the quotations on pipe.

Buttweld.	Per 100 feet. Black	Galv.
⅛ in.	$ 3.50	$ 5.09
¼ and ⅜ in.	3.24	5.37
½ in.	4.17	4.74
¾ in.	5.06	7.19
1 in.	7.48	10.46
1¼ in.	10.12	14.38
1½ in.	12.10	17.19
2 in.	16.28	23.15
2½ in.	25.74	36.56
3 in.	33.66	47.81
3½ in.	42.32	59.34
4 in.	50.14	70.31
Lapweld.		
2 in.	18.13	25.35
2½ in.	28.08	38.32
3 in.	36.72	50.11
3½ in.	46.00	63.02
4 in.	54.50	74.67
4½ in.	63.50	87.00
5 in.	74.00	101.40
6 in.	96.00	131.50
7 in.	128.50	172.60
8 in. L.	135.00	181.30
8 in.	155.50	208.80
9 in.	186.30	250.10
10 in. L.	172.80	232.00
10 in.	222.50	298.70

Prices, Ontario, Quebec and Maritime Provinces.

Range Boilers Have Advanced in Price

RANGE BOILERS.—As indicated in SANITARY ENGINEER in last issue, the price of range boilers has advanced considerably. This has been due to the firming tendency and higher prices in all galvanized steel sheets. In the 30-gallon standard boilers the price is now $10 as compared with recent quotations of $8.25 to $8.75. This represents an advance on this grade of $1.25 to $1.75. On the 30-gallon extra heavy there has been an advance of $1, the new selling price at the time of writing being $12.50.

Lead and Oil Firm

WHITE LEAD.—Although there have been no advances in white lead, the market is holding quite firm at recent quotations of $14.25 in small lots and $13.95 per 100 pounds in ton lots. The pig lead market in New York was slightly easier last week, but not in sufficient degree to affect the price of the corroded lead. Red lead continues firm in price and is quoted from 13½ to 14c per lb. for genuine quality.

LINSEED OIL.—The oil market is decidedly firm at recently advanced prices. Discouraging crop reports from the Argentine and Western Canada are sending the price soaring. Raw linseed oil in single barrel lots has reached a

level of $1.20, boiled $1.23 per gallon. Lower prices are quoted occasionally by firms having stocks which were purchased at figures much lower than today's costs.

Putty is in slightly better demand and quotations are as follows:—Standard 100 lb. drums, $3.00; 25 lb. drum, $3.10 per 100 lbs.; pure, 100 lb. drums, $3.70 per 100 lbs.; 25 lbs., $3.80 per 100 lbs.

Lead Products Hold Firm

Lead sheets are still quoted as follows:—

3 lbs. sq. ft.—$11.75 per 100 lbs.—$12.50 cut to sizes.

3½ lbs. sq. ft.—$11.75 per 100 lbs.—$12.50 cut to sizes.

4-6 lbs. sq. ft.—$11.50 per 100 lbs.—$12.25, cut to sizes.

Lead pipe is quoted at 13c and lead waste pipe at 14c. Traps and bends are quoted at 10 per cent. off list. Lead fittings are quoted at 70 per cent. Wiping solder is unchanged since last report and is quoted from 23¾ to 26½ lb., according to brand. Bar solder remains firm and quotations range from 24¾c for commercial to 28½c for guaranteed.

Further Advances On Sundry Lines

Cotton Waste Goes Higher

WASTE.—Cotton waste has advanced from ¾c to 1¼c lb., according to grade. On polishing waste there has been an advance of 1c, the selling price now being 18c per pound. On the white wiping waste there has been an advance of 1¼c per pound. The new prices on these brands range from 13c to 17c per pound. On the fancy colored wiping waste there has been an advance of 1¼c, while on the lower grades of the colored there have been advances of ¾c to 1c. Wool packing waste remains the same as previous quotations, the range being from 10c to 20c per pound. Washed cotton wipers also hold at previous quotations of 12c for white, 9c for mixed colored and 8c for dark colored. All cotton goods are decidedly firm, owing to the high prices and strength in the primary markets.

Premier Sheets Advance

Premier galvanized sheets have advanced 5c per 100 lbs, and present quotations f.o.b. Toronto are as follows:—10¾ oz., $6.80; U. S. 28, $6.50; U. S. 26, $6.20; 22 and 24, $6.05; 18 and 20, $5.90; 14 and 16, $5.75.

Miscellaneous Lines Advance

Soldering irons have advanced owing to the high price and continued strength of copper. The base price is 61c lb.

Wire Nails Advance Further

Wire nails have advanced another 15c per 100 lbs. and are now quoted at $4.10 base, Toronto. This advance follows continued firmness and recent advances in the price of wire rods. The new price establishes a new high record price for wire nails.

Oil Storage Systems to Go Higher

By reason of the recent heavy advance in the steel market one of the large oil companies, which often handles a line of gasoline and refined oil storage tanks, has been compelled to anticipate an advance in these articles in the near future. The advance has not yet been put into effect, but it is expected that by the end of the week an advance of fully 10 per cent. will be recorded.

Plumbers' Oakum in Good Demand in East

OAKUM.—There is a big demand for plumbers' spun oakum at the present time, coming more noticeably from the vicinity of Montreal and in Quebec province generally. This is taken as an indication that industrial development is proceeding apace there perhaps a little more strenuously than in any other part of the Dominion. In Ontario there is a good demand for this article, although not as heavy as farther east. In the West there is a light demand at present. There has been no change in price since recent quotations were given in these columns. For the various kinds of oakum the quotations are as follows:—

	Per Pound
Plumbers' spun oakum	$0.08
U. S. Navy (English)	0.15
New Hemp (English)	0.15
U. S. Navy (American)	0.18½
Best American	0.19½

Ingot Metals Are Holding Very Firm

The metal markets continue steady and in most cases firm. The copper situation is still the principal feature of interest. The demand for copper is very heavy and few producers hold any metal for the first quarter of 1917. The spelter situation has improved and quotations are holding firm, with producers still disinclined to sell freely.

COPPER.—The export and domestic demand for copper continues heavy, and some sellers have disposed of all their production up to July, 1917, while few have any metal for sale until after the first quarter. The market is very strong. Local quotations are firm at 20-31c.

TIN.—Tin advanced recently in London, the reason not being explained. The situation in New York appears to be somewhat complicated, and the increase in the visible supply has not depressed the market as is usually the case. Permits to ship tin from London to New York are still difficult to obtain. Local quotations are firm at 47c per pound, and the demand is good.

SPELTER.—The market continues strong and producers are reported to be still disinclined to sell freely, believing that prices will go higher as the price of ore has advanced about $7.50 per ton, thus increasing the cost of producing spelter. Prices are a little higher locally at 12½c to 13½c per pound.

LEAD.—Quotations are firm, but the market continues quiet, although there are indications of more activity in the near future. Lead is unchanged locally at 9¼c per pound.

ANTIMONY.—The market is easier and business dull. Quotations are unchanged at 18c per pound.

ALUMINUM.—The demand is rather quiet, but the market is steady at unchanged quotations. Local price, 68c per pound.

PIG IRON.—Pig iron is higher by $2 per ton, and the market is strong.

Iron Washers Advanced

Iron washers have advanced and full boxes are quoted at 25 per cent. off instead of 20 per cent. as formerly. Further advances are expected on bolts and screws.

SINK TALKS

Why are all sinks set up about 30 inches from the floor? Why does no one invent a new line of brass goods that can be used in such a way as to make it possible to alter the height of the sink to suit the height of a person.

One year a short person is engaged to labor in the kitchen, next a tall one. For the former 30 inches high would be O.K., breaking the back by bending would be the experience of the tall person.

A variation of 6 inches would be all that's necessary.

If any of our readers want to know how this can be done drop a letter to the Editor and he will show you.

The idea will save many sore backs and will be at least a departure from the beaten track. Any sanitary engineer who adopts new methods, new practices, and gets off the beaten track, will be building up a new field of his own every time. Be a specialist and do something. Install something which the other fellow "hasn't got on to."

SANITARY BATHROOMS

No bathroom, lavatory, or toilet room should have a wood floor these days. Tile, cement, or any other material that is damp-proof and waterproof, is preferable.

All walls, too, should be free from any absorbent material, at least up to four feet from the floor.

A Plea for Strict Plumbing Codes

Control of Plumbers By Water Works Departments Suggested—No Doubt More Uniformity Should be the Rule

By DR. WM. PAUL GERHARD, C.E.
Consulting Hydraulic Engineer and Sanitary Expert, 30[illegible] 12nd Street, New York City.

Historical

The [illegible] inspection of plumbing [illegible] cities of the United States began about the year 1881. In this year, too, the first complete plumbing code was adopted, and among the cities leading in this movement were Lawrence, Mass.; Washington, D.C.; New York City, Brooklyn, and Chicago, Ill. The official control of plumbing work had, for some years previously, been agitated and urged by health departments and by persons interested in house sanitation.

As seemed natural, the first codes were enacted and enforced by health departments. Later on this work was shifted over in some cities to the municipal building bureau, it being claimed by some that it was more logical to include the duty of plumbing inspection with the numerous other functions of building departments. Practical advantages as regards the filing of plans in particular were claimed for the change in departments. Yet even to this day the control of plumbing in the majority of cities (about 80 per cent.) which have enacted a code is in the hands of health commissioners or their assistants, and this is due to some extent, no doubt, to the popular belief that there is some connection between bad or imperfect plumbing and disease.

In more recent years, even States have enacted laws, providing for the local control of plumbing, and have issued general rules for plumbing, drainage, water supply and ventilation of buildings.

Not only the large cities of the country, but smaller cities, towns and villages, adopted plumbing codes. As a rule, it is safe to state that such smaller communities do not need rules elaborated and amplified as much as we find them in the codes of large cities, as, for instance, the one proposed for Cleveland, etc.

Definition of Plumbing

According to [illegible] definition, plumbing originally was the art of working in lead, which definition is no longer complete, as other materials have now [illegible] lead. It would be more [illegible] to say plumbing [illegible] all work, not only of lead, but also of brass, [illegible] with the installation, fitting [illegible] pipes, [illegible] and fixtures for water, gas or

SYNOPSIS

Historical.
Definition of Plumbing.
Definition of Plumbing Code.
Why Are Plumbing Codes Required?
What Points Should a Code Embrace?
Licensing Plumbers.
Licensing Drain Layers.
Certificates of Inspection.
What City Department Should Control Plumbing?
Efficiency in Waterworks Departments.
Control of Water Waste.
Waterworks Rules and Regulations.
Some Details Regarding the Water Supply of Buildings.
Conclusion.

drainage in any building. One code says plumbing should be held to include and govern all work and material:

(a)—For introducing, maintaining and extending a supply of water through a pipe or pipes, in any building, lot or premises;

(b)—In connecting or repairing any system of drainage, whereby foul waste or surplus water or other waste matter is discharged through a pipe or pipes from a building, lot or premises into any public or private sewer or drain or public or private property;

(c)—In excavating in any public or private property for the purpose of connecting or repairing the service pipes of any building, lot or premises;

(d)—And generally in performing all classes of work usually done by plumbers.

Definition of Plumbing Code

The word "code" in law signifies a unified and co-ordinated system of rules and regulations.

A plumbing code can, therefore be defined as a systematized set of rules and regulations governing the work of plumbers in or about buildings. But looked at from a practical point of view, a good plumbing code is much more than this: it should form a working manual for plumbing firms and plumbers' employees; it constitutes, or ought to be, a safe guide for architects, sanitary engineers and builders, whose work embraces the laying-out, and who have charge of, plumbing installations; and, finally, a sanitary code should act as a protection to property owners, to the tenants or occupants of buildings; it also enlightens them about, and introduces them into, the "mysteries" of sanitary plumbing.

A sanitary plumbing code should embrace all safe and established methods, systems and arrangements, for properly supplying water to buildings, and for removing the befouled water, after use, by a system of house drainage pipes. The enactment of such code necessarily includes the licensing of plumbers and drain layers and the control of their work by properly appointed inspectors, municipal or otherwise.

What Points Should a Code Embrace?

The following are some of the essentials:

(a)—It should specify the use of proper plumbing materials and require first-class workmanship.

First-class work implies both good materials and a careful laying out and carrying out of the work.

(b)—It should provide for a sanitary and safe arrangement.

Safety requires of the entire work freedom from leaks in waste, soil and vent pipes, as well as in supply pipes.

(c)—It should strive to introduce safer, simplified and more economical plumbing, systems and layouts.

The advocates of "simplified plumbing" are slowly but surely gaining ground. Some of the most prominent experts in plumbing and sanitation have for years striven to obtain "simplification," even in the plumbing codes.

(d)—It should consider the possible relation between plumbing and preventable disease.

While it seems doubtful, according to recent scientific researches, whether bad and unsanitary plumbing can actually cause disease, there can no longer be a doubt about the fact that long-continued noxious odors, due to leaks in the plumbing, or to insanitary fixtures, may cause a depressed state of health and a lowering of the vitality.

(e)—It should provide proper material and sizes of service and house supply pipes, and thus insure a sufficiency of wholesome hot and cold water.

A proper water supply system is as important for a building as a sanitary house drainage system. Plumbing fixtures without a sufficient water supply should not be tolerated.

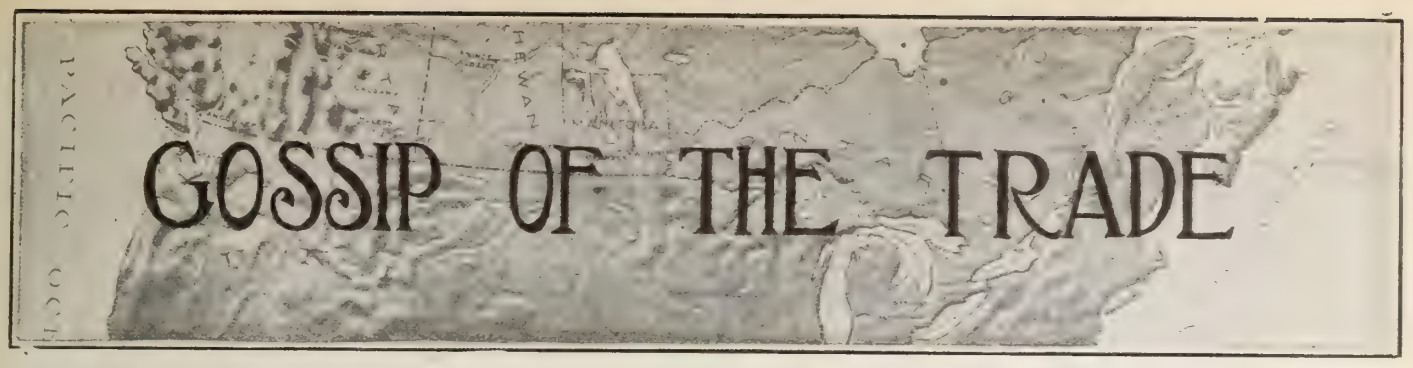
(f)—It should provide proper, strong and durable water fittings, faucets, ballcocks, tanks, etc.

The strength and durability of all water fittings tends to economy in maintenance, and for this reason it should not be overlooked in a plumbing code.

(g)—It should make provision against both waterhammer and noise in the house service pipes.

A good mechanic knows how to guard against waterhammer in a supply system. The entire abolishment of noises in the water pipes, boilers, and in flushing tanks is desirable, but not always easy to attain.

(Continued on page 34.)



TORONTO NEWS ITEMS

Gone Off Hunting

William Mansell and party, which by the way includes that famous old sport, one Lewis LeGrow, are spending the hunting season on "Sir William's" reserve in the wild woods of Muskoka. Whether they secure their allotment of deer or not, they will be assured of lots of fishing, as William has a lake all of his own, that is plentifully stocked with the fine finny ones, that are yet to be told about.

New Partnership

That "old regular" James L. Bloomer of east end fame, has taken on a partner to himself. In this instance it is not a better half, because Jim has already one better half as well as several little "Bloomers," to prove the fact. But in this case it is a partner in business. The lucky individual to join forces with "Jim," being Mr. Arthur Chippenfield, and they promise to make things hum in the east end. The new firm styles itself under the title of Bloomer & Chippenfield, and is opening new show rooms at 1945 Queen street east. Our best wishes for their success are cordially extended.

Toronto's Society President on the Hunt

Fred H. Gentle, the genial president of the Toronto Society, is sojourning in the North Country for the past two weeks, in quest of somewhat different game than that which takes up his time when in Toronto. Here's hoping that he gets a moose. Fred is also an enthusiastic lawn bowler, having been recently elected to the vice-presidency of the Riverdale Lawn Bowling Club.

Keeping Up With the Times

There do be rumors about that John Wright one time famous lacrosse player, but of more recent connection with a certain baseball club, about which the least said the better, is about to become the proud possessor of a Cole 8, whatever kind of an animal that may be. It does, however, sound not unlike the title of a high grade auto. It must be high grade because John does not deal in any inferior commodity.

Prohibition "Don't Prohibit"

There are many ways of "seeing things" these days in spite of the fact that the Ontario Government has tried to shut a few of these avenues off. A. F. Passmore and Wife, spent a holiday doing things down in New York City. That place is some pumpkins, says Jack. You ought to see the Elephants play base ball. Looks funny to us. What say you? In the old days of "seeing things," it was generally snakes. But there is evidently another brand being prescribed in New York.

K-night of the Grip

A treat is in store for the party who meets that old Sheik of the grip, Harry Farthing, when you meet him, ask him to tell you that tale of the "Has Bean." The price of paper will not permit us relating the story, and there's nothing like "Farthing's Grip" and the personality he puts into his stories.

Watch Out for Bill Schultz and His Saxon Six

Bill Schultz is a busy bee these days, buzzing about in his Saxon Six. Watch out he don't catch you, or you will get one where you wont want it.

High Cost of Living

Many are the ideas as to the why of the present high cost of living, but at a recent meeting of the Ossington-Oakwood Ratepayers' Association, our friend J. R. MacNichol expressed his opinion as follows:

"You will never reduce the high cost of living until you get the people back on the land. The land is not being worked and very little is being produced considering the enormous amount of land which is lying at our doors. The rural districts are being depopulated, and the population of the cities increasing. Farms are daily becoming depleted and rural blacksmith shops and country stores closed. This, in my opinion, is largely responsible for the increased cost of food stuffs."

Joint Examining Board of Plumbers' and Steamfitters' Apprentices

Toronto, Ont., Nov. 9, 1916.
22 College St.

Editor Sanitary Engineer,—As you will notice from the above heading, the source from which it comes to you, you will no doubt think to yourself, well here is something new to me, so, to my mind will it be something new to the readers of your valuable paper, throughout our great Dominion.

I do not know of any place, where there is in existence an examining board, that deals exclusively with the apprentices at our trade. I therefore, feel that the trade in Toronto are entitled to the honor that comes of being the pioneers in any line of endeavor, and I think the trade throughout Canada will agree with me.

The above board came into existence, through the efforts of the representatives of the Toronto Society of Domestic Sanitary and Heating Engineers, and of local union No. 46 of the United Association of Plumbers and Steam Fitters of United States and Canada. Clauses were included in the agreement entered into by these two bodies, whereby the apprentices engaged at the plumbing and heating trades in Toronto, have to be registered with this board, within six months of their starting at the trades. The boys are examined as to their fitness and ability, as well as to their knowledge of the requirements of their respective trades, when they are at it from two and a half to three years, and if they show the desired efficiency their employer is granted a certificate by the board, duly qualifying the boy to handle the tools of his trade.

If the boy is not successful on his examination, he remains for six months longer helping, at the end of which time he again appears before the board.

When the apprentice has served his two years with the tools, he again comes before the board, and tries his final examination, that qualifies him as a full-fledged mechanic, capable of carrying on his vocation in a proficient manner. The apprentice being provided by the board

a diploma as to its proficiency.

The board is composed of seven persons, as follows: Two plumbers, two steamfitters, and three masters, there being also a secretary who attends to the clerical work in connection with the board.

The first board is composed of Messrs. Alex. Rattray, Thomas Willis, John Wright, Thomas Maxwell, William Gallacher, William MacKenzie, and Harry Waterman.

These gentlemen have given considerable time to perfecting all the required matters pertaining to the work of the board, having completed the examination papers for the different trades, and groups of same. The first examination has been held and was a success from all points. Naturally this being a new departure, it will take a little time for it to become generally understood, but eventually, when the boys and the bosses, as well as the journeymen, get to realize the benefits of the system, it will be appreciated by all hands. The boy will take that added interest in what takes place in connection with his work, so that he will be able to come before the board and secure his right to handle the tools of his trade. Not as they do to-day, never a thought of anything but base ball, or the hour to quit work. Also it seems to give that added incentive to a boy, to be all the time on the lookout for information pertaining to his calling, that in the days gone by, he never worried about.

When you consider the opportunities of the new Technical School in Toronto wherein there is the finest class room for plumbing and steamfitting, there seems to be nothing lacking to make out of the boys of to-day, the mechanics for to-morrow, as far as Toronto is concerned.

Thanking you, Sir, for your many kindnesses, and promising further articles regarding the examination of the plumbing and heating trades, I remain,

Respectfully yours,

G. F. FRANKLAND,

A FIGHTING FAMILY

Walter Boddington Not Killed

In the last issue of THE SANITARY ENGINEER, it was reported that Walter Boddington, son of W. E. Boddington, sanitary engineer, Toronto, had been killed.

However, it now transpires that such is not the case. Corporal W. C. Boddington was wounded very badly in the knee with shrapnel, some of the pieces are still firmly lodged there. He is at present confined in the Norham Hospital at Petersfield, England. It might be that he will be invalided home.

Mr. W. E. Boddington has another son on the fighting line. Gordon V. Boddington now ranks as Gunner Boddington. According to last report he is as "fit as a fiddle," and in the right humor to do the "Kaiser's lackeys" justice.

Mr. and Mrs. Boddington have quite a large number of nephews doing their bit. Amongst them are Corp. George Wellar, Albert Gould, William Gould, who has lost an eye in battle, C. Kindal, F. Kindal, Norman Boddington, son of Charles Boddington, Gordon Boddington only son of Wm. J. Boddington. Five of these nephews have already been wounded.

This family have certainly sent out their quota into the fight. Walter E. Boddington finds the absence of his two sons a great loss to him in his business. Both of them assisted him considerably, though Walter was employed for some time by the Standard Sanitary Co., Ltd., Lombard street.

The accompanying illustration show Mr. and Mrs. Boddington and family (five sons and two daughters), two of whom are referred to.

(Continued on page 34.)

Mr. and Mrs. Walter E. Boddington and family, five sons and two daughters. Two of the sons in uniform are now overseas.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

TOO MUCH HOT WATER

Editor The Sanitary Engineer.

I installed a pneumatic water system a few months ago, and a complete house of plumbing fixtures are connected to it. Range boiler is connected up to the kitchen range, the same as a city job. It is also connected to the furnace. I had no complaint from my customer until the last week or two. The trouble is too much hot water. When there is a hot water tap turned on the boiler simply jumps. It is an ordinary 30-gallon range boiler, and I run the pressure up to 80 lbs.

Can you give me any idea what is the cause of this jumping and pounding when a tap is turned on? I might say that at times steam comes out of taps.

P. W., Sask.

In the first place, we do not endorse the practice of connecting a range boiler to a pneumatic water system on account of the excessive pressure which may possibly be put upon it. The best way is to run a pipe from the cold water supply to a cistern controlled by a good ball cock. This cistern to be connected as a supply tank to the range boiler and nothing less than ¾-inch pipe used on the hot water pipes. This will govern the pressure constantly on the range boiler. Next, P. W. tells us that he had no complaint until about a week ago. Does this not suggest the cause of the trouble at once?

Before the winter set in, only the water front in the range would be in operation heating the water. The furnace is now in use, and a heater being in the furnace, it is also heating the water. Therefore, there is too much heating surface for a 30-gallon range boiler. We would suggest that either one of the heating mediums be disconnected for the winter time. It may be best to discon-

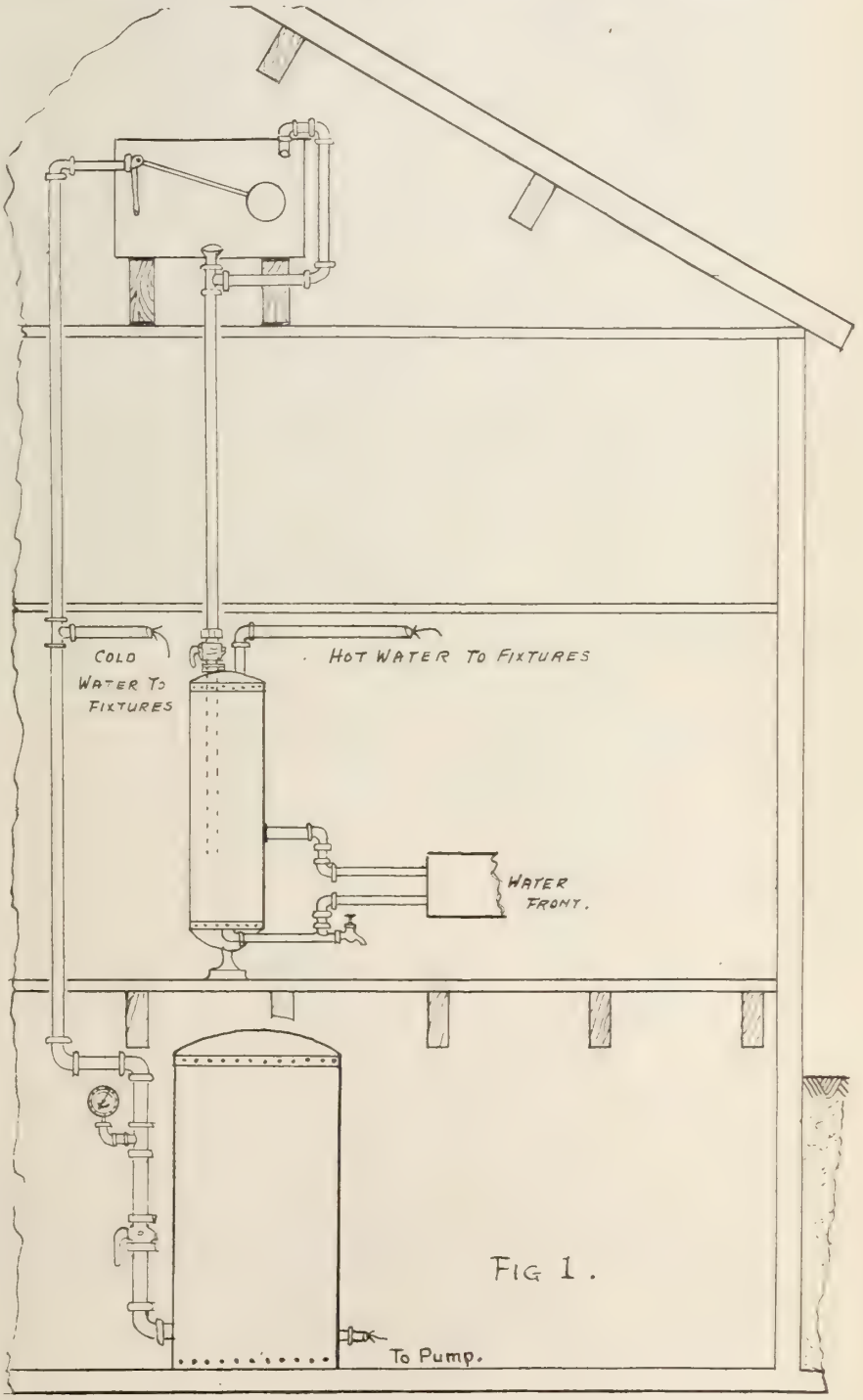


FIG 1.

water front and fitting in a plain fire-front.

It would also be wise to install a cistern. But no doubt the first suggestion will overcome the trouble, though it may be that even the heater in the furnace is too large for a 30-gallon range boiler.

Fig. 1 shows the safest way to connect a pneumatic water system up so as to use a cistern to furnish water to the range boiler.—Editor.

A PLEA FOR STRICT PLUMBING CODES

(Continued from page 30.)

good against the freezing of pipes and also efficiently prevent any undue waste of water. The last two requirements are of such importance that they will be dealt with at length further on.

In addition to the above, the plumbing code should provide that none but tappers employed by the water department should be permitted to tap the street water mains, and likewise that connections with public or street sewers should be made for the plumbers by employees of the sewer department.

The more concise, comprehensive and brief a plumbing code, the better will it fulfil its purpose. Clearness of wording is essential. Each paragraph, each rule, should be definite; and there should be no doubt left as to their proper meaning. No arbitrary interpretation of a rule by the plumbing inspectors should be possible. The importance of this last requirement is too self-evident to need any discussion.

I am thoroughly familiar with the plumbing rules of many cities and towns, and my observation has been that some of the best-framed codes originated in the smaller cities. In the case of the larger cities there has been too much copying from one another, without any attempt being made at originality.

(Continued in next issue.)

ONTARIO SEWAGE DISPOSAL LAW

(Continued from page 27.)

a member or officer of the Board.

Penalty

(3) Every person who contravenes any of the provisions of section 1 shall incur a penalty of not more than $100 for each offence, and each week's continuance after notice by the Provincial Board or local board to discontinue the offence shall constitute a separate offence. 8 Edw. VII. c. 19, s. 32.

It will therefore be seen by the above extract that those who install or allow to be installed any kind of sewage disposal system that is not in accordance with the best and most sanitary practice, are really breaking the law, and if sanitary engineers wish to see better and more sanitary conditions prevail in our rural districts at least, they should take advantage of such health ordinances in force as will assist those in charge to bring about such conditions. As regards the duty of each sanitary engineer re plumbing construction in rural residences, this we will take up in our next issue.

(Continued in next issue)

RURAL SANITATION

(Continued from page 25.)

impure effluent to travel great distances without even being filtered in any way. Water supplies may be thus polluted. The danger, though in many cases slight, should always be regarded as a possible one in every case.

Now if once a day the liquid sewage from a tank used by an average-sized family could be evenly distributed at the open points of the 100 feet of tile, the results would under favorable soil conditions be undoubtedly all right. But four, eight or even twelve gallons (see State Board of Health rule quoted above) of water added once a day hardly seems enough to insure the concentrated liquid sewage being evenly distributed in the tile—a few joints might get it all.

For such tanks it is estimated that the volume of human discharges and toilet paper is by liquefaction and evaporation reduced over one-half. The liquid that, however, is forced from the tank at irregular intervals will evidently reach only the first few lengths of tile. The overworking of the bacteria at these joints would be, it seems, almost sure to result in clogging, and at any rate in the liquid sewage not being properly purified.

In spite of the recommendations by the Board of Health after three years' trial the writer feels justified, therefore (while recognizing it as a great improvement over previous conditions) to cast some doubt on the method of sewage disposal by the Kentucky "sanitary" privy from a sanitary standpoint.

A FIGHTING FAMILY

(Continued from page 28.)

It is to be hoped that as soon as the war is over we shall have the pleasure of reporting the happy reunion of this fighting family.

It would not be out of place to further refer to Walter E. Boddington, senior.

He is one of the old guards, and an active member of the Toronto Society of Domestic Sanitary and Heating Engineers, and takes a great interest in its affairs. Has held various offices at a number of its affairs, and believes in giving every one a square deal. Has a splendid connection and is looked upon as being one of the best mechanics in the city of Toronto.

Mr. Boddington could fill a book with stories of the old days when lead was the pipe used, and when the boys would run a race as it were to finish a job in the best and quickest way.

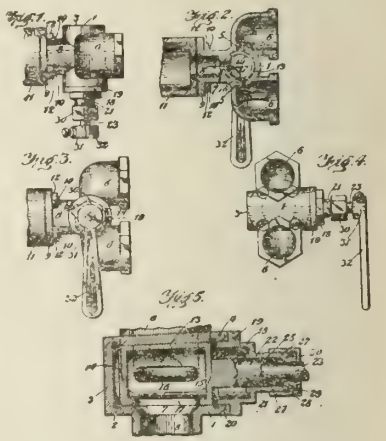
He's one of those men who while still having a warm corner in his heart for a neat wiped joint, agrees that it takes more than a good "joint wiper" to make a good efficient plumber or as he is now termed, sanitary engineer.

Brother Boddington has no use for the price-cutter, as was evidenced by an interview which the writer had with him recently. It is to be hoped that the good work being done by the father of this family in fighting the cause of the trade will at a future date create a greater freedom in a business way just as the fighting sons he has sent overseas will do their bit in establishing permanant liberty, and freedom from Prussian militarism for the whole world.

NEW CANADIAN PATENTS

(Continued from page 22.)

sleeve encircling said valve stem and extending into said tubular extension against said packing, and an adjustable device for causing said ring to impart



No. 169,957. Valve.

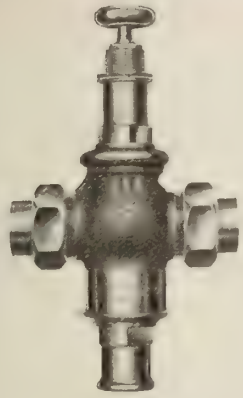
any desired degree of pressure against said packing effectively to force said valve body toward the smaller end of said valve casing.

NEW RADIATOR FOLDER

When showing a customer the style and design of a radiator which you purpose installing in his building, it is very essential that the type be well described, both by a neat illustration and full particulars.

With this in view the Steel and Radiation have gotten up a very attractive radiator folder. It is without doubt a work of art in every way, artistic and useful. When opened out, this folder measures 11 x 28 inches. Write for one to their address, Fraser Ave., Toronto.

Boiler Mountings, Steam Specialties, Engineers and Plumbers' Supplies



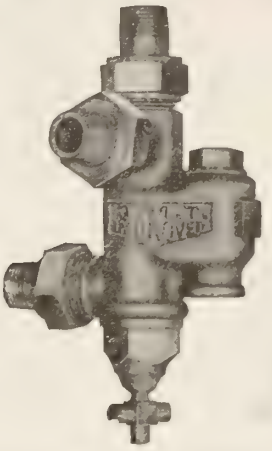
J.M.T. REDUCING VALVE

Will not equalize, is extremely sensitive and will maintain a steady reduced pressure regardless of the variation of the initial pressure.

Made in sizes ½" to 6".

MORRISON AUTOMATIC CELLAR DRAINER

Automatically drains flooded areas by means of water jet. These machines have been in use for four years without requiring the slightest attention.



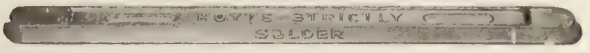
J.M.T. IMPROVED INJECTOR

Operates successfully on steam pressures from 20 to 220 lbs. per sq. inch. 4 to 400 horse-power.
Made in sizes ⅜ in. to 2 in.

The James Morrison Brass Manufacturing Co., Limited

93-97 Adelaide Street West, Toronto, Ontario, Canada

Our Mixed Metal Sales Amount to Over $5,000,000 Annually

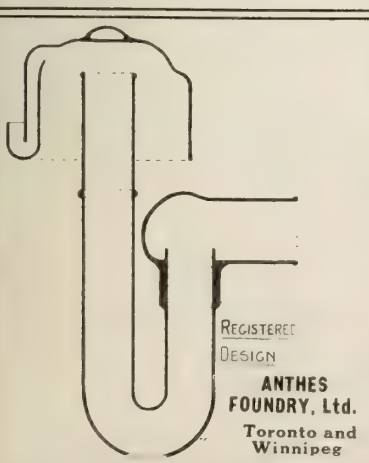


HOYT'S WIPING SOLDER is as perfect as experience and first class ingredients can make it. As only one perfect Wiping Solder can be made we manufacture only one grade, which must necessarily be Hoyt's high standard of quality.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends. Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO

New York, N. Y.; London, Eng.; St. Louis, Mo.



IF IT'S SYPHONS, ASK US

And look at this one. Note the long caulking length.

Ask us about our inside vented syphon. It's a dandy. Saves making many joints.

We unconditionally guarantee every syphon to operate automatically. And it has no moving parts.

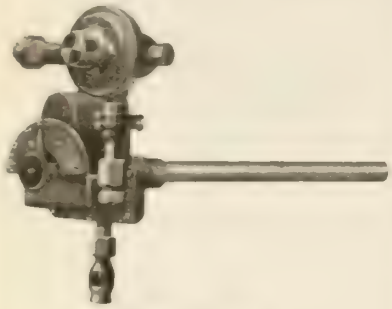
Ask your jobber for "Anthes" Syphons and accept no other.

ANTHES FOUNDRY LIMITED

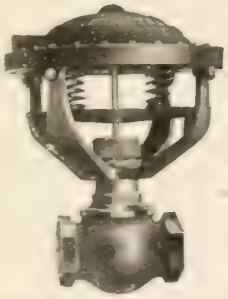
TORONTO and WINNIPEG

POWERS MONEY SAVERS

No. 10 Tank Regulator



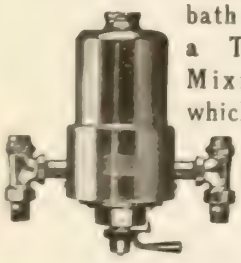
REGULATOR



Applied to Domestic Water Heaters. Prevents Over-heating and Saves Steam.

DIAPHRAGM VALVE

Satisfaction Guaranteed



Powers Shower-bath Controller a Thermostatic Mixing Valve which insures a constant temperature.

Easily adjusted to any desired temperature.

Positively Anti-Scalding.

The Canadian Powers Regulator Co., Ltd.

115 Bay Street, TORONTO

World-Famed Specimens of the Age of Steel

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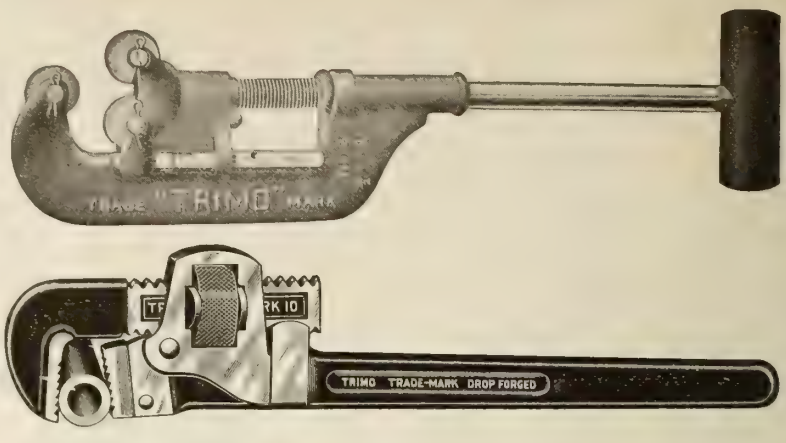

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FORGETTING

One of the things we all do well is to **forget.**

Names that were household words yesterday are gone to-day.

Because people knew your Name and your Line a year ago it is no sign they do to-day. They forget easily.

Keep yourself in the public mind by advertising. It is just as important to make old friends remember as it is to win new friends. Advertising does both.

IF CAR IS RIGHT ADVERTISING PAYS

This is Experience of John N. Willys, Who Plans Biggest Campaign.

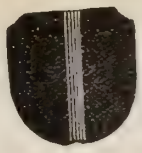
"This year as heretofore we shall continue our liberal advertising programme in national publications, farm and trade papers, and we will also conduct a larger newspaper campaign than ever in the past," declared John N. Willys, head of the great Willys-Overland Company, of Toledo, in answer to a question concerning his future advertising plans. "We find our various models of cars even more attractive than ever before; careful and shrewd buying has fortified us against any possible shortage of materials; the country is enjoying an unprecedented wave of thrift and prosperity, and our factory facilities, including new buildings and equipment, are sufficient to warrant an output of 300,000 cars for the year.

"Advertising is just as essential in the modern manufacturing business as is the factory in which the product is turned out," concluded Mr. Willys. "If you are building a product of real worth and merit, it is obvious that you should inform the public of that fact and thus build up a market for your product. The man who has something worth while to sell and does not advertise that fact is hiding his light under the proverbial bushel and, nine times out of ten, he gets nowhere.

"When I authorize an advertising appropriation I first make myself absolutely certain that the models of cars which we are producing are worth talking about. I want to be sure that we have something in which every reader of advertising will be especially interested. Then, too, one must take into consideration the general conditions existing as to availability of material markets, general tone of prosperity throughout the country—because if the people haven't money there is no use in trying to sell them automobiles—and also consider our factory conditions relative to the size of the output which we can safely figure on turning out."

You can talk across the continent for two cents per word with a WANT AD. in this paper.

GENUINE BELL WASHERS


FULLER

The only washer made that will stand hot and cold water. Look for the name on every washer. None genuine without it.

Sold By All Canadian Jobbers.

Manufactured only by

Estate of Andrew Bell

2-4-6 Commercial St. Newark, N.J.

More Dollars

You can make "Dollars Grow" out of your *spare time*. Spare-time efforts have made hundreds of dollars for MacLean Representatives. To-day there are in Canada, men and women, who find that our proposition worked for an hour or two daily provides for many of the added luxuries of life. You supply us the time,—we'll supply you the money. Write for full particulars.

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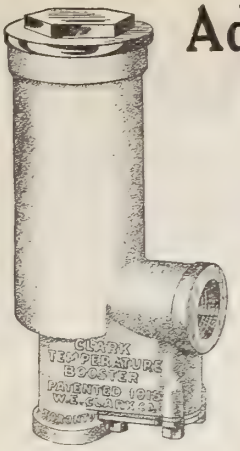

Advance in Price

Owing to the continued advance in raw material and labor, we are reluctantly forced to increase the price of the

CLARK Temperature BOOSTER

The new price is 40% off list.

The **CLARK TEMPERATURE BOOSTER** increases heat on any system and will positively cure that slow, sluggish system.

Made in Canada Only.

W. E. CLARK, Limited

719 King Street West - - Toronto

PRACTICAL SHEET METAL WORK

(Continued from page 24.)

circle as shown by the dotted lines. With AB as radius draw successive circles using B, 1, 2 and 3 as centres, cutting the circle at the points 1, 2, 3, 4 respectively. Next join B1, 12, 23, 34 and 4A. These lines will form a regular hexagon with sides all equal to the given line AB.

Fig. 6. Erect a Regular Heptagon on a Given Line

Let AB be the given line. With B as centre and AB as radius draw a circle. extend line AB to cut this circle at D. Next with A as centre and with AB as radius draw an arc cutting the previous circle at C. From C draw CF at right angles to AB cutting AB at F.

Next with FC as radius place the point of compass at D and draw an arc cutting the first circle at G, by drawing line, from B to G, the second side of the heptagon is developed.

Now bisect line BG at K and at right angles to it draw KH intersecting FC, produced, at H. With H as centre and HG as radius draw a dotted circle as shown. By using the length of line BG as radius draw arcs on dotted circle, thus dividing it into five more parts. By connecting these points described the desired heptagon is developed.

Fig. 7. Draw a Regular Octagon Upon a Given Line

Let line AB be the given line. First bisect AB at C. Next draw a circle with B as centre and BA as radius. Extend line AB to cut this circle at D. From B draw BE at right angles to AB cutting the circle at E, and with E as centre and EB as radius draw an arc and with D as centre, using same radius draw another arc cutting the first arc at F. Now draw a line from B to F. Cutting the circle at G. BG forms the second side of a regular octagon.

Now bisect line BG at K, and from C and K draw CH and KH at right angles to AB and BG, meeting at H. With H as centre and HG as radius draw a dotted circle, dividing same with length of line BG into equal parts as shown 1, 2, 3, 4, 5. Now draw lines from points G1, 12, 23 and so one until all are connected, this will complete the desired regular octagon.

Fig. 8. To Bisect a Given Arc

Let AB be the given arc. Join AB and bisect the straight line AB at G. Then draw GD at right angles to AB, cutting the arc at D. The arc AB is then bisected at D. Similarly if required the arcs AD, DB may be bisected at E and F and the arc AB will thus be divided into four equal parts.

HOW PRICE-CUTTING AFFECTS QUALITY.

The evils of price-cuttting almost always fall upon the purchaser, for, whilst in some instances indifferent materials or workmanship may serve the purpose equally as well as when elaboration is carried out with high-grade materials, everything connected with the sanitary and heating trade should be the best possible so that reliable and serviceable productions may be obtained.

Price-cutting produces inferior substitutes, for, naturally, however keen a person may be on underselling his neighbors, he keeps all the time an eye on profits and never hesitates to take advantage of something similar at a less profit. Competition—that is to say senseless competition—sets out to force the price still lower, thus bringing about a further reduction in quality until the ridiculous is reached. Co-operation in business is far more necessary for the welfare of all rather than competitive price-cutting which must result in poor quality of both goods and workmanship.

Classified Buyers Guide

Occasionally advertisements are inserted in the paper after this page has gone to press. The insertion of the Advertiser's name on this page is not part of the advertising order, but is inserted solely for the convenience of the reader of the paper

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Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.

Air Valves.
Empire Mfg. Co. Ltd., London, Ont.
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Darling Bros., Ltd., Montreal.
C. A. Dunham Co., Ltd., Toronto.
Jenkins Bros., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.

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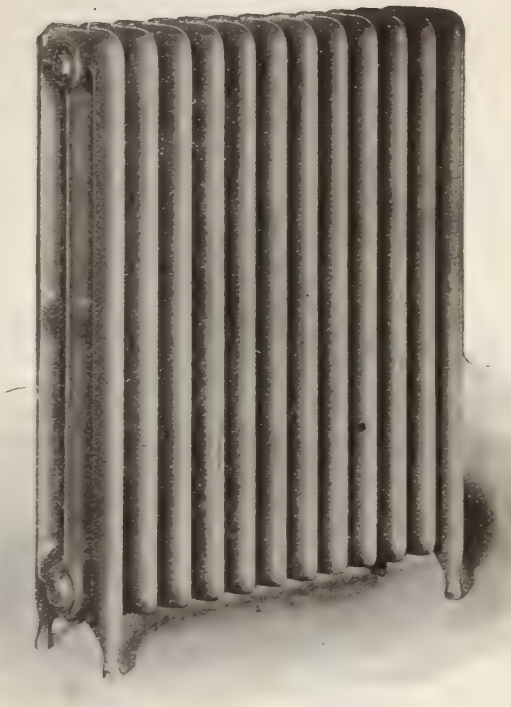

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BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED
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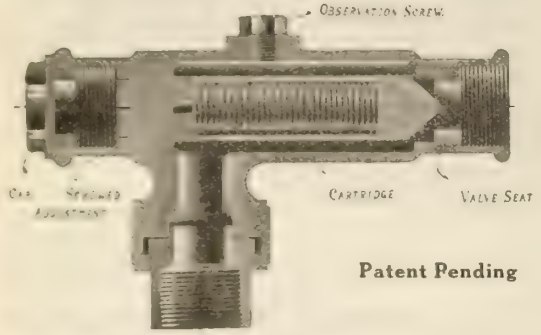

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For High and Low Pressure Steam, Vacuum or Vapor Heating.

Made in Canada
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That's the pipe connection made with the Dart Union Pipe Coupling

Dart Unions stay tight, because the **Bronze to Bronze** faces cannot rust or corrode and the heavy iron parts will not stretch, or pull apart.

Make sure that all pipe coupling work will require no further attention by using Dart Unions. You'll give a satisfaction that will bring you increased business.

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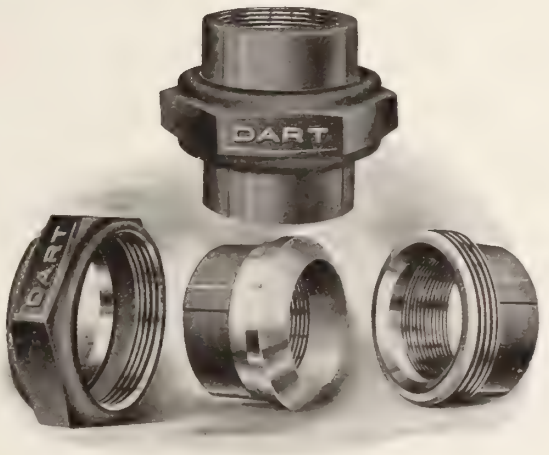
Sold by all supply houses. Absolutely guaranteed.



Manufactured by
DART UNION CO., Limited
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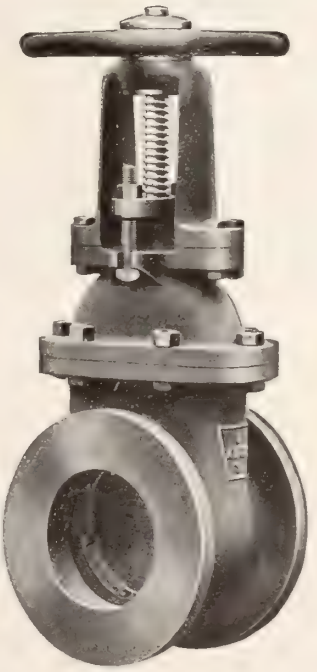
advertised and sold, but not all of them possess that neat appearance, combined with strength and stability, which characterizes

KERR IRON BODY GATE VALVES



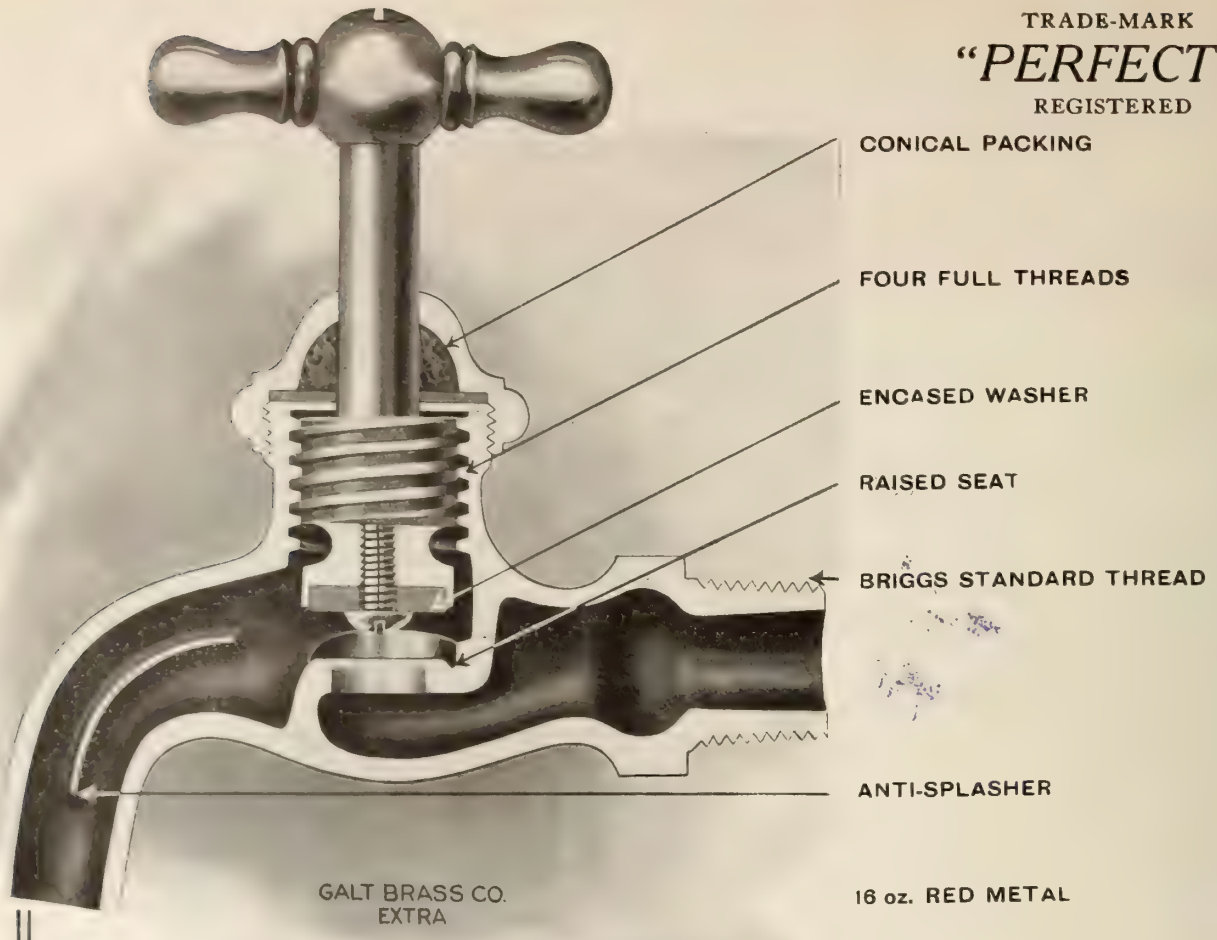
Specify KERR'S (KEYSTONE) Iron Body Gate Valves on your next order, and let us prove what we claim for them.

Our Catalogue No. 5 tells all about them. It is yours for the asking. Write us to-day.

Approved by the Fire Underwriters Association, and Registered by Boiler Inspection Departments of Ontario, Saskatchewan and Alberta.

THE KERR ENGINE COMPANY, LIMITED - Walkerville, Ontario

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. X | Publication Office: TORONTO, DECEMBER 1, 1916 | No. 23

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EMPIRE
OIL-CONTROLLED VALVES

TOP PUSH

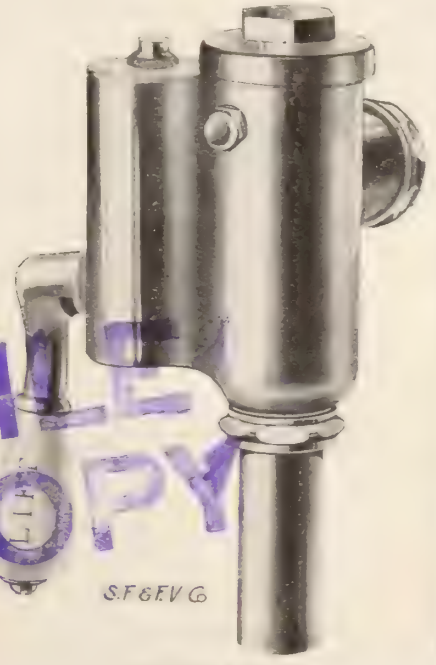
In producing the Empire Oil-Controlled Flush Valve we have overcome the most objectionable features in the Modern Bath Room. Water-closet troubles are entirely eliminated; no noise, no leaks or other nuisances to contend with. They require no adjustment and will operate with equal sucess in muddy, gritty or salt water, without affecting any of the working parts. The control is entirely confined in the oil chamber and will operate years without any attention whatever. *We guarantee this valve.*

Special Features of the Empire Oil-Controlled Valve

1. No by-pass.
2. Perfect after-fill.
3. Noiseless in operation.
4. All working parts accessible.
5. Not affected by water conditions.
6. Will work at three pounds pressure or over.
7. Can be operated with or without oil control.
8. Readily adjusted as to volume of water and duration of flush.
9. Oil control can be removed without shutting off water or interferi with operation of valve.

In addition to oil-controlled valves we carry in stock all lines o China, Vitro and Oak Tank Outfits of the highest quality.

Catalogue A sent on request



BOTTOM LIFT

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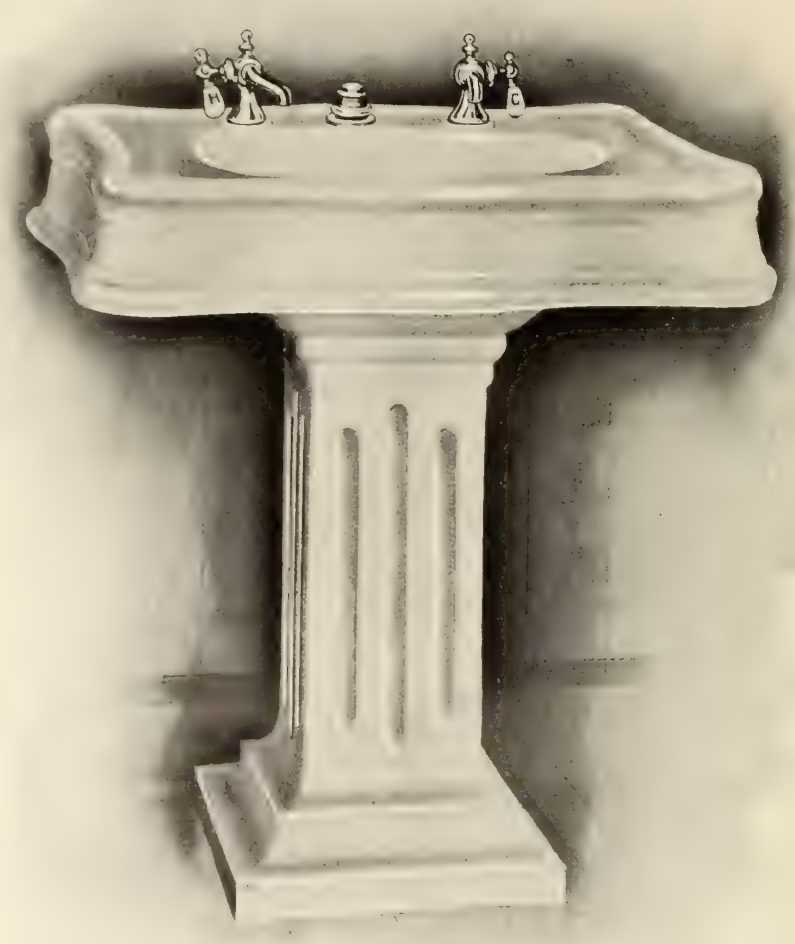
Empire Mfg. Co., Limited

LONDON TORONTO

A Beaver Brand Pedestal
is a Lavatory Fixture Worth While



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A bathroom which is fitted with Beaver Brand cast iron enamel ware bears the stamp of quality and lasting service, and a pedestal lavatory puts such a bathroom in a class by itself.

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And Specialize in

TUEC STATIONARY CLEANERS

THE TUEC stationary cleaner is the final word in sanitary housekeeping. It is the direct result of many years of *special* experiments by a force of inventors and expert mechanics working together.

There is nothing just as good, and there is certainly nothing better than the TUEC stationary cleaner. Not only does it clean all dust out of a home, but while doing so it ventilates the home.

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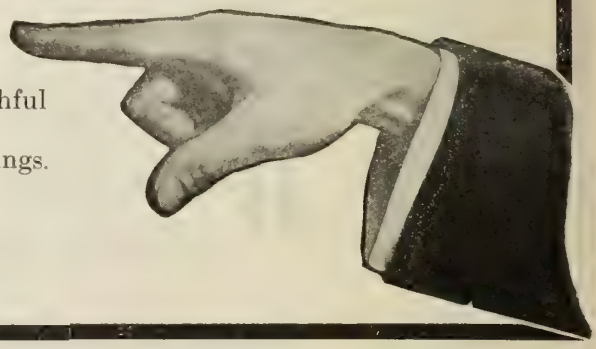


PURE AIR, pure food and pure water are necessities to healthful living. But the most important of these is pure air.

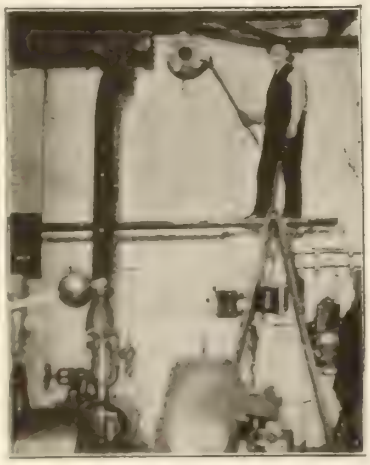
SANITARY ENGINEERS are experts at piping buildings. Why not pipe the next job for a TUEC?

If in doubt ask us.

The United Electric Company

159-161 Richmond St. W., Toronto, Ontario

A "TOLEDO" at work in an awkward position.



A 6-inch pipe projecting only 10 inches through a brick wall, and 12 feet above the floor required to be threaded. It would have been a costly job to have taken it down to have the thread cut, but a "Toledo" No. 3 quickly did the job.

It took two men, only, to get the tool up on the pipe.

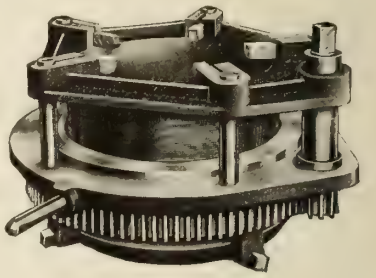
After it was up, one man easily cut the thread.

"Toledo" and "Jardine" Ratchet tools, work in any old corner.

They finish a thread at one cut, making as clean a job as if cut in a lothe.

They are made in Canada. One man does the work of two.

Write for catalog and full particulars.



A. B. JARDINE & CO.

HESPELER, ONTARIO

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"Toledo"
Geared Adjustable Threading
Tool No. 3

Capacity 4½" to 8" inclusive, complete with Ratchet and Driving Cross.

This tool does the work that formerly required a heavy power machine.

One man can easily thread an 8" pipe.

Every Door Fits as Snugly as a Cork in a Bottle

There are no doors that *almost* fit on a Burnham Boiler. Every door must fit *exactly* before the boiler leaves our factory.

For we know, as you know, that it's the doors that **almost** fit that cause unwanted drafts. And unwanted drafts boost coal bills.

First every Burnham Boiler door is **trued** up by machine. Then the door is chalked and pressed against its frame. In this way every slight rough spot and irregularity is shown up. These are filed smooth by hand with even greater particularity. This chalk test is repeated until every door is absolutely **smooth** and **true**.

The painstaking care which is taken to make every door fit as snugly as a cork in a bottle is characteristic of the way in which every section of the Burnham Boiler is made.

As we understand it, this is the kind of a boiler that you want to sell. Let us tell you more about it. Send for our catalog. We sell to the recognized jobber and legitimate Plumbing and Steamfitting Trade only. No goods sold retail.

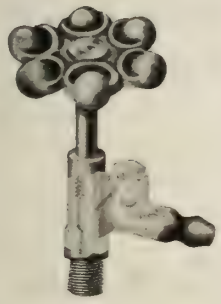
Lord & Burnham Co. Limited of Canada

(Boiler Department)

Royal Bank Bldg., TORONTO

Burnham Cosy Comfort Heat BB

Factory: ST. CATHARINES, ONT.



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Safety Air Valve

Equip your Furnace with a Safety Air Valve with Ball Check, thereby overcoming danger of fire, explosion, etc.

Wolverine Improved Coil Furnaces are equipped with this Safety Valve.

Furnace Bulbs

Guaranteed perfect Valves and will not collapse.

Complete Line of Furnace Repairs carried in stock for immediate delivery.

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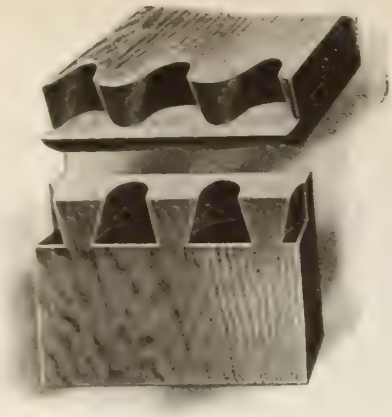
CHATHAM - - ONTARIO



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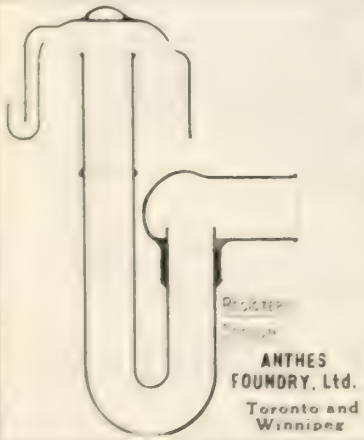

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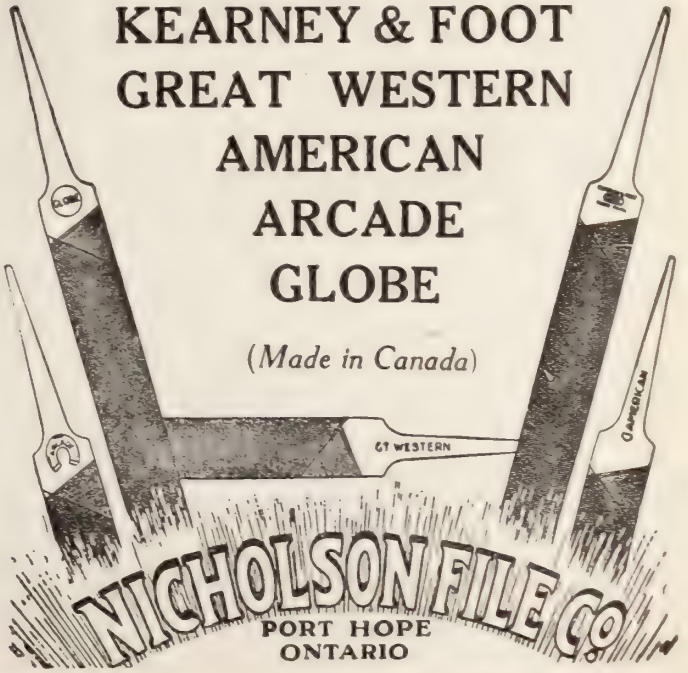

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TORONTO, CANADA

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Morehead Back to Boiler SYSTEM

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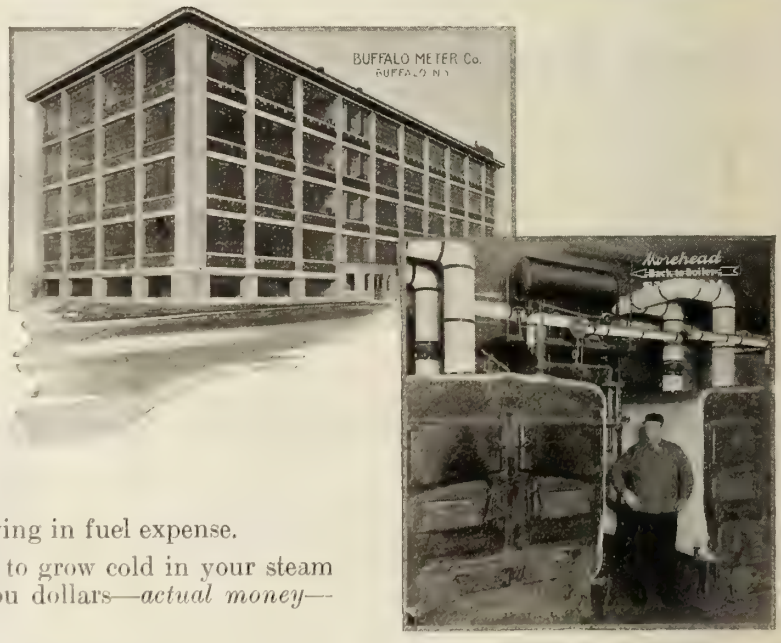

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BRUSSELS

SANITARY ENGINEER

PLUMBER AND STEAMFITTER OF CANADA

Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, DECEMBER 1, 1916 No. 23

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EDITORIALS

High Cost of Living—Cost of Doing Business—A Practical Opportunity—Editorial Briefs.

The MacLean Publishing Co., Limited

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MADE IN CANADA

EVERY FITTING TESTED

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"The Trouble I was put to when installing the old style Tank, nearly drove me crazy, nearly drove my customers all away. I couldn't go down the street without fear of some one saying "What about that ——— Tank."

Trouble and I have parted company since I began to install VITRO NO-TROUBLE TANKS.

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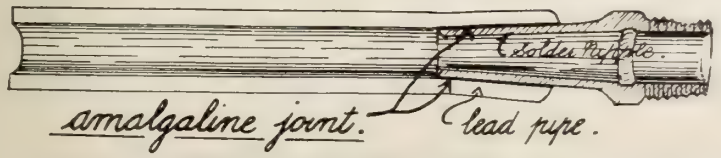

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TO MAKE THE ABOVE JOINT you simply drive in the Solder Nipple. Then take it out, file smoothly and clean. Then clean the inside of the pipe smoothly, taking care not to alter the taper inside. Now wrap a piece of amalgaline ribbon round the solder nipple, insert it into the lead pipe, drive tight and warm with blow lamp. Very little heat is required.

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186 Manning Avenue, TORONTO

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WRITE US FOR PRICES

TOLD IN A SMOKING CAR

A Motor containing a party of ladies and gentlemen from the United States broke down on the Kingston Road, in Ontario, opposite a farmer's house.

The farmer's wife invited the ladies into the house while repairs were being made. Her brother tells the story.

She was the wife of a well-to-do farmer in comfortable circumstances. She had a nice home, was proud of it, and, womanlike, showed the party through. Afterwards, in describing the visit she said that she could not have had any greater pleasure than that which came to her from showing the visitors her three-piece bath-room.

You can imagine it: A beautifully clean room with snowy white enamelware IN A FARM HOUSE, and then, Mr. Plumber, sit down for a minute and think. There are over ten thousand just such prosperous farmers in Canada, whose wives would be equally proud of just such a bath-room and would be willing to put it in if they knew where and how easy it is to get it.

It's the Plumber's job to tell them. It's new business, real business, and the man who will do it will become a real business man, the kind that will succeed.

When you are making a specification, say you'll use PORT HOPE ENAMELWARE. It carries a perpetual guarantee, and will help you make the sale.

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FORMERLY

The Standard Ideal Co.

Head Office: ROYAL BANK BUILDING, TORONTO

Works: PORT HOPE, CANADA

Branches at Toronto, Montreal, Winnipeg and Vancouver

THE SANITARY ENGINEER

VOL. X DECEMBER 1, 1916 No. 23

The Cost of Doing Business

Cost is Something Absolute, It Must Be Paid in Some Form or Other and by Some one —The Person Starting in Business Should Never Lose Sight of the Cost of Doing Business, if He Wishes to Succeed.

BY ONE OF US.

Article I.

HOW many young fellows in our line of calling, when starting in business on their own account, ever count the cost?

The last thing in the world would be to discourage such a young man. We want as much new blood in the business side of our calling as does any other profession, but we want the newcomers to start right.

Those who have labored for a number of years can recall the hard fight they have had, the scores of promising young men who have gone under—men with splendid ideals; men who were, and still are, excellent mechanics.

But they have, 90 per cent. of them at least, "not counted the cost."

Cost, that thing absolute, that something so very real, yet so mysterious. Cost, the thing or question which is puzzling thousands to-day of the finest accountants and mathematicians.

If you, readers, will bear with me for a few moments I will show you how real as well as how mysterious cost really is.

The Mystery of Cost

Count the cost—what cost? I am starting in business. I know my work from beginning to end. I can study in the years to come just as I have in past years, and thus keep step with every progressive step. My employer only pays me 50 cents an hour, and he charges 80 cents. I work steadily, and every hour he nets 30 cents. Why should he?

Besides all this, he makes a big profit on the material he sells, and so on. This is the first step down the steps to mystery cost.

How many are there to-day who can recall just such thoughts as those mentioned? How many have pondered over their first month's work and found themselves "shy on wages even?"

Then has come the mysterious reasoning: "Oh, well, I'll break even on this job, and I'm sure to make so much on so-and-so's job." Mysterious cost has begun to materialize, and it must be carried against future business. No future business should be made to bear previous cost; and if we adopt this system, we are soon going to have our business "driving us" instead of the reverse.

Conduct your business, or it will conduct you, is a very true saying, and should be well considered by every person starting on his own account. "He that goeth a borrowing, goeth a sorrowing," is another truism never to be lost sight of; and he that buyeth on credit and does not meet his payments upon maturity is borrowing.

AN APPRECIATION

81 Colborne St. Brantford, Ont.
Editor, The Sanitary Engineer:

I have followed with interest, articles re discussion on credits and discounts, and I want to congratulate you on dealing with such a good, live subject which I trust will be given the consideration it deserves by the trade throughout the country.

If more of the craft would give some interest to the business end as well as to the mechanical, the trade would be on a better footing to-day.

Yours truly,
T. A. COWAN,
per C. B. HENDERSON,
Business Manager.

Therefore, when buying on credit, or not paying cash on delivery, we should never lose sight of cost—cost of the material plus interest on the credit. Or, if paying cash, we should charge interest on our money just as if we had loaned it out on interest.

Everything has its cost which has to be paid some time by some one. Paying cash for material is really loaning money on account of material.

Now here is the first question to decide, which takes the mystery out of cost.

Cost Materialized

Business—What is business? How did the term materialize? The word or term "business" is really an abbreviation of "busy-ness," and in the olden days a person appearing to be actively engaged in some labor or other may have been asked, "What is your busy-ness." Now, when a person starts in business on his own account his busy-ness should be productive of profit. He expects to make a little money at least, more than if his busy-ness consisted in working for an employer for wages or salary. He has no cost attached to his position except those of his household expenditure. But on his own account there are "other items to be considered." We will say he buys goods with surplus cash. His money was previously deposited in a savings bank; he was receiving 3 per cent., and no fear of losing his principal.

If, however, the money was out on loan and could be procured on demand, the interest may be as high as 5 per cent. Five hundred dollars is the amount. It is drawn out and invested in material. Just as soon as this step is taken, the material becomes liable to a 5 per cent. interest. Item No. 1.

Next there must be a workshop procured, and even though this is behind the house (sad to say there are too many of these "back shops"), and the rent of the house is, say, $30 per month, surely the shop should be worth $5 a month. Item No. 2.

If a person is to conserve his time, and be in close touch with the business world, he must have a telephone, approximately $50 a year. Item No. 3.

A small stock of stationery must be secured—at least a year's supply, which could not be procured for less than $10 to $15, say, $13. Item No. 4.

It is assumed that this person is in possession of a good kit of tools, which will, upon being used constantly the year round, require at least a little replenishing, say another $13. Item No. 5.

We are only considering a one-man

start, and must deal with the smallest possible amount of expenditure; but here is another item—cost of lost time, time which cannot be charged for on a bill to a customer. What shall we say about this item?

It may be reasoned out that "to make up for this item I intend to work an hour or two a day extra." Here is where mystery cost is trying to make inroads; but that will not do and cannot be allowed if we are to conduct our business and not let it conduct us. To allow this to be done would be sacrificing the liberties which were previously ours when working for an employer. Therefore, all time if engaged in our business must be charged for, and it would be a very reasonable average to allow two hours per day, say out of 11 hours, that allows the person to charge 9 hours per day to "some job." So that we can count 2 hours a day at least under item No. 6.

Now, what salary was our man receiving? We mentioned 50 cents per hour, and assuming a 9-hour day, would mean that if he worked 11 hours, 2 hours' cost would be $1 per day cost of doing business, approximately $300 a year. That looks big, does it not? But we will have to allow it. His late boss would pay that for his services, were 11 hours constituted as a working day; and why have a "busy-ness" that is not going to pay any more than have a boss that will not? So that item No. 6 is very real to the extent of $300 per year. No mystery cost about it.

The next matter to take into serious consideration is, where is the salary for the 9 hours coming from? Why, from the customers, of course, is the reply we hear. All right, but there must be something or someone who is going to be responsible for at least a year. We assume the telephone account, the interest account, the rent. We cannot allow salary to be termed "mystery cost."

Three hundred working days, 9 hours per day, comes to 2,700 hours, at 50 cents—$1,350 per year. Item No. 7.

At 11 hours per day the amount would be $1,650, and it must be paid if you conduct your business and not your business conduct you.

The next matter will have to some extent to be approximated—that of the amount of business which has to be done to pay the various fixed amounts just named, which only time and regular work can liquidate, but which must be counted as cost.

Let us add up the items already under consideration, though there are more which should be included, but for the first year we will assume that the salary will take care of these. They are: Fire insurance, employers' liability, postage, extra car fares. Cartage we will also leave out for the first year, assuming that the supply house will deliver our goods to the job.

Salary	$1,650 00
Tool upkeep	13 00
Stationary	13 00
Telephone	50 00
Rent of shop	60 00
Interest on $500	25 00
	$1,811 00

A total of $1,811, and this is a very small approximate cost, which as the articles are published will be unfolded; but for the present this item will suffice.

This amount must be divided by 300 working days, and in that way provide for Sundays and holidays. This comes to about $6.04 per day, which must be met in some way or another. Now, the question is, how should this be done?

(Continued in next issue.)

HERE AND HEREAFTER.
THE PLUMBER'S DREAM.

"Last evening I was talking
With a plumber, aged and gray,
Who told me of a dream he had,
I think 'twas Christmas day.
While snoozing in his office,
The vision came to view,
For he saw an angel enter,
Dressed in garments white and new.
Said the angel, 'I'm from heaven,
The Lord just sent me down,
To bring you up to glory,
And put on your golden crown.
You've been a friend to everyone,
And worked hard night and day.
You have plumbed for many thousands,
And from few received your pay.
So we want you up in glory,
For you have labored hard,
And the good Lord is preparing
Your eternal, just reward.'
Then the angel and the plumber
Started up toward glory's gate,
But when passing close to hades,
The angel murmured, 'Wait,
I have got a place to show you;
It's the hottest place in hell,
Where the ones who never paid you
In torment always dwell.'
And, behold, the plumber saw there
His old clients by the score,
And grabbing up a chair and fan,
He wished for nothing more
But was bound to sit and watch them,
As they'd sizzle, singe and burn,
And his eyes would rest on debtors
Whichever way they'd turn.
Said the angel, 'Come on, plumber,
There's the pearly gates I see;'
But the plumber only muttered,
'This is heaven enough for me.'"

GOOD BOOKKEEPING

A very important phase in every man's business is that of a reasonably good system of bookkeeping..

It would be far better for a man in business to have a proper system of books of accounting, than having to buy on credit.

Bankers to-day are far more reasonable and will extend one's credit more readily when a good bookkeeping system is adopted. It need not be an elaborate affair by any means. But it should show what the overhead expenses are. Correct amount of debit and credit accounts, stock and a periodical inventory.

No man should try to lie to his banker not by inference or any other way.

There is an old and true saying that "if you wish to make a success in business you should never lie to yourself, your wife or your banker," and no doubt this is a very true saying.

We all very often are inclined once in a while to feel that the bank manager is a little too stiff, but without doubt there has been many a failure which could have been averted had the applicant for an extension of banking credit been candid, about his state of affairs and been in the possession of a clear statement of his affairs.

Just as many or rather shaky business has become a success because of the assistance given by the banker.

We should never lose sight of this fact, that money on deposit in a bank is not the manager's but rather other people's.

THE ETHICS OF ADVERTISING

Few things succeed without advertising, and so from time to time we see the ethics of publicity discussed by eminent men of business as a philosophy. There can be little doubt that the great American public are moved deeply by this force of special pleading, which is characterized by Mr. Charles Jeffrey, president of a big motor concern of the same name, as advertising strategy. His views on the subject are worth quoting as revealing one of the principal causes of the enormous growth of the automobile industry in the United States, and the methods which are being employed to secure markets for American manufacturers in all parts of the world.

"I have always," Mr. Jeffrey says, "been a great believer in consistent advertising. There are many reasons why I advertise, any one of which would be sufficient. I advertise because advertising is the greatest starter of conversation—and it's conversation that makes a thing well known. The American people—in fact, all peoples—like to own things that are well known. Ask a man what car he drives, the brand of his haberdashery or his hat, and in ninety-nine cases out of a hundred he mentions those that are extensively advertised. He wouldn't be satisfied unless he could. He wants to own and wear the things concerning whose quality there is no question. The newspapers are in a class by themselves. I advertise in them because they are flexible mediciues, capable of giving the quickest action. That is, they provide the means for us to concentrate our forces on a certain city or community. They make possible a fine art of advertising strategy. And they get quick action when it comes to sales." Clearly, it is because business men in the States do not look upon spending money in this way as a nuisance or necessary evil that the art of advertising has become a strategic science.

What About Our Wounded Soldiers?

Sanitary and Heating Engineers Can Give Honorable Employment Which Will Bear Cost of Fair Remuneration and Become a Boon to This Industry.

IT is very doubtful if there is a single industry that has sent a greater percentage of men overseas than have the sanitary and heating engineers and sheet metal workers.

In Toronto alone, one shop with 20 men employed, has sent 17; another with 100, regularly, sent over 60, and so on.

One may be asked why so many went? Simply because the trade was suffering on account of the building trade being so quiet when the war broke out, and because a lot of journeymen were unmarried and felt that they could better serve their country by enlisting than by staying at home. They heard the call and responded. Now, the question is, what are we going to do for our wounded? No charity scheme will be acceptable, nor commendable. We must get together, form local committees made up of representatives of employers and journeymen. The committees should discuss pros and cons, and arrive at some sound scheme in readiness for a big lot of returned soldiers, who have worked in some capacity or other, and have acquired some special knowledge and training in connection with the trade. All matters have to be given a start and THE SANITARY ENGINEER, therefore, takes the liberty to make a few suggestions in this article.

What part of our business is there that requires some special improvement right now? What is it that is the cause of most of our failures, or shall we say, why are there so many men in the business that find it a hard task to make both ends meet? Lack of business training is one reason; lack of the art of salesmanship is another. And both these occupations can be filled by men who will not be fit to do the hard muscular work they were previously engaged in.

Suppose a number of classes be formed to give these returned men a training of this kind; they know all or a great deal about the work of installing the goods we handle. They can be given a salesmanship training, or they can be provided with positions as inspectors.

For instance, the province of Ontario has a Health By-law. Certain clauses deal with plumbing and the proper installation.

Why not allot certain districts and have permits issued for plumbing to be installed, followed by inspection of same. Let these men use the training they have to the benefit of those living in rural districts. Even create an information bureau in these districts, where a farmer can get the advice of these men as to how and where plumbing fixtures should be installed. Not in any way to injure the trade, but rather to encourage the greater use of plumbing fixtures and heating appliances.

Scores of these returned men would make admirable salesmen, calling upon the farmers and rural residents. Bookkeepers could be made of such men, giving them a training as to how cost should be figured out, general business management, etc. In small shops these men could look after the telephone, stock, and collection of accounts. They could in many cases act in the capacity of formen, order clerks, and estimators.

THE SANITARY ENGINEER has for many years advocated the annual inspection of all plumbing, which is very necessary. The public are having repairs made by men who are not thoroughly competent, and in many cases the work done creates a menace. If work of this nature was done any time between inspections, and the previous report showed the state of the installation proving that poor work had been done after the last inspection, those men doing the work could be brought to time.

It is a well-known fact that a lot of uncalled for repairs are executed because of poor work in the first place. Therefore, by keeping a better check upon such work annually, the public would benefit, the trade would be brought to a higher standard and these men who have a good mechanical training and have been rendered unfit for hard muscular work, would be given suitable employment.

Another Suggestion

Mr. George Iles, a Canadian writer, who devoted much attention to this subject, writes to the Military Hospitals Commission, suggesting that electricity may also furnish a congenial and profitable occupation for many of these soldiers when they leave hospital.

Electric smoothing irons, toasters, heaters, lamps, motors, sweepers, and tools are very popular where they have been introduced. Their popularity is bound to go on increasing as they become better known, and a large increase of output will bring about a decrease in price when normal times return. The price of electric current has been reduced already, thanks to partial development of our magnificent water powers.

A blind officer, Lieut. Edwin Baker, one of the few Canadian soldiers who has lost the sight of both eyes, has just been appointed to a position on the engineering staff of the Ontario Hydro-Electric Power Commission. Mr. Isles suggests that many other Canadian veterans unfitted for hard muscular work, might well be employed, as canvassers and demonstrators, in popularizing electrical appliances throughout the country.

The Battle of the Somme, where Canadians have played so conspicuous and heroic a part, is sending home hundreds of men unable to rejoin the fighting ranks, and thousands of our disabled men had returned even before that great battle had begun.

Every suggestion of useful and profitable employment for injured soldiers, therefore, is to be warmly welcomed.

The brains as well as the sympathies of the nation must be actively engaged in promoting the success of this national enterprise.

Moses Irons Uses Sense in Buying *

Fiction, but packed with practical hints on how to speed up the rate of turnover. He discovers that getting men to work together is a good deal like training colts to team.

By Daniel Louis Hanson. *Illustrated by C. D. Mitchell.*

MOSES IRONS both looked his displeasure and voiced it: "I don't like it, John! Here we are carrying a stock of a trifle over a million—which should have a rate of turnover of four times a year—yet fully three hundred thousand of it is stuff which doesn't clear itself once in five years. Yes, some of it will probably be here fifty years from to-day. Take these sewer rods—forty sold in three years out of a purchase of four hundred—"

"Four hundred was a ridiculous buy, sir; fifty would have been an overstock," John Renwick, sales manager for Moses Irons & Company, remarked.

"And here are these Ilerious Lights, almost guaranteed to yield dividends to the gas consumer instead of bringing him a monthly bill. We bought twelve gross of the confounded contraptions and in two years we have sold two gross. That means an investment of—" Moses Irons began to figure.

"I had nothing to do with buying them, sir."

"Certainly not with selling them"—at this retort Albert Pearsons, who was occupying the corner chair smoking one cigar and holding the other ready, smiled—"That's an investment of nearly a thousand dollars. We have gotten back less than two hundred."

Mr. Irons's finger continued to run down the columns of the stock book. "In 1909 we bought a car of Unique baths, eighty all told. Through the strenuous efforts of the sales department we have disposed of fourteen in three years. 'Of the sales department,' did I say? Of Moses Irons, I mean. I myself inaugurated a push campaign and got rid of twelve—the other two went out entirely due to your efforts, John." The proprietor made a low bow towards his sales manager.

"The claim department is now negotiating for the return of six out of the fourteen," said John Renwick, dryly.

"Don't you let them take them back!" thundered Moses Irons.

"And lose customers by getting into a snarl?"

Moses Irons turned to the stock book: "But here is something for which there isn't the least excuse—two cars of toilet sinkum bought eighteen months ago—two thousand bales—and we have more than two-thirds of it left. But wait a moment." He turned to the next page. "Here in that same period we have picked up on call orders no less than five hundred bales. What does that mean, John?"

"I'll tell you, sir." Renwick leaned forward over the flat-topped desk. "The trade doesn't want the ordinary oakum. That is, the majority of our customers would rather pay half a cent more a pound, and get the rolled stuff ready to use, than pay a plumber eighty cents an hour to twist it into shape on the job. That's why."

"Why didn't you tell us that two years ago?"

"I had no chance—the first thing I knew two cars of this stuff were switched into the yards."

Mr. Pearsons didn't laugh this time, but his eyes twinkled—and as the ironmaster looked his way, the "Dixie Yankee" became interested in the shipping on the river.

"And here are tool bags—at least a dozen kinds of plumbers' tool bags—none of which seem to have moved. No effort has apparently been made to get rid of them."

"The copies of the Bulletin will show, sir, that not a little effort was made in that direction. As a matter of fact, the sales department has taken more time than it should have away from pushing the regular and profitable lines in order to get after this five-and-ten-cent-bargain-counter truck loaded on us by the purchasing department. We can't afford to have the trade gain an impression that we are junk dealers. Our high-grade line carries too much velvet to venture risking it in connection with salvage sales."

Moses Irons still devoted himself to the stock book, so Renwick continued: "There is no reason why we should either lose money on a lot of cats, dogs, and yellow pups such as the stuff you have been calling off, Mr. Irons, or should turn three-thousand-dollar-a-year salesmen into junk peddlers. I shall be glad at all times to co-operate with the purchasing department with advice—"

Moses Irons was waving his finger under the buyer's nose. "Your judgment is as diminutive as your conceit is colossal!"

"You are the sales manager, not the buyer, John," said Moses Irons in a tone that almost carried an implication that Mr. Renwick was getting out of his proper place.

"As long as you take that view, sir, as long as you insist on maintaining a stone wall between two departments which can only work to advantage when co-operating, you will always have a third of your stock tied up just as these items you mention are. And you will also be getting only fifty per cent. effectiveness from your salesmen."

Renwick had risen from his chair and was actually confronting his chief. Albert Pearsons had now turned his back on the river and was devoting all his attention to the two men.

"Sit down, John, and calm yourself,"

said Moses Irons. The invisible button must have been pushed, for the door opened. "Byshee, send Saybrook in."

II.

"Saybrook," the ironmaster demanded, as the buyer entered, "what do you mean by accumulating a lot of yellow pups that clutter up the various floors? Here we have over three hundred thousand dollars tied up which doesn't turn over once in five years!"

"I am not the sales manager, sir. I am only the buyer. If I could have the opportunity of suggesting sales methods I am sure that you wouldn't have to complain of cluttered up floors or capital unnecessarily tied up—"

"Sit down, John!" commanded the ironmaster—Renwick was showing unmistakable signs of extreme agitation. "Of course, Saybrook, you counselled with the sales department before making some of these purchases—Ilerious Lights, for instance, and sewer rods?"

"No, Mr. Irons. I am the buyer. I am always held entirely responsible for my own actions."

"How do you gauge your buying then, Saybrook?" Moses Irons's tone was portentously mild.

"I get stock reports from the various foremen," the buyer explained, "then I see what we have sold in the past. Next, I figure out the probable increase for the immediate future."

"And changes in old lines, new patterns, and the like?"

"The salesmen who solicit our business keep me posted, sir."

"So you really are in consultation with sales departments then—but not ours? And these Ilerious Lights?"

"A splendid line, sir; though it requires some sales initiative to get a market."

"And the sewer rods? We have about enough on hand to last the remainder of this century."

"Our sales department hasn't done quite what I was led into believing it could, sir. It is simply impossible, I might say, for any purchasing department to hamper itself by consulting with a sales department. The buyer must rely on his own judgment as to the salability of an article—it is the buyer's judgment that must stand the test—"

"It must, eh?" Moses Irons exploded. At the same moment Alert Pearsons let the front legs of his chair down on the floor with a thump "Saybrook"—Moses Irons was waving his finger under the buyer's nose—"your judgment is as diminutive as your conceit is colossal! Here is your judgment—Ilerious Lights, sewer rods, out-of-date tool bags, tools that are fit only for kindergartens, oakum that we will have to sell at a loss—you hadn't heard about the rolled oakum because that doggoned judgment of yours was in the way! Three hundred thousand dollars of my money tied up—"

"My judgment wasn't at fault, Mr. Irons. If you had me in charge of sales—"

"You would make a—" Renwick burst out.

"Hush, John. You know that if there is any swearing to be done in my office, I'll attend to it," Moses Irons continued. "Now, Mr. Saybrook, I am not going to waste any time in discussing your judgment, but it will be absolutely necessary to revise our purchasing methods—or rather to install a new system in buying. Just what that will be I can't say at this moment, but one thing is sure—our new policy will provide for buying co-operation between your department and the sales end. The information Mr. Renwick gets through his salesmen—not to speak of what he gathers up from other sources—is so valuable that it must be utilized by the purchasing department—"

Saybrook rose. "I am sorry, sir, but I must insist on being entirely unhampered in my work. I can't get along under dictation from any other department manager. I am held responsible for my work and I must be allowed to carry it out."

Albert Pearsons was afraid that his friend was going to have a stroke, for that part of Moses Irons's anatomy visible to him—his neck—became purple and streaked with distended veins. But the ironmaster controlled himself. He did not speak until the buyer had reached the door and had his hand on the knob.

"Were you going out, Saybrook?" he then inquired. "In that case you had better stop at the cashier's window and settle up. Just draw what is coming to you up till the first of next month. I'll make no deduction of these three hundred thousand dollars for which you assume responsibility so courageously. Good-bye, Saybrook, and good luck to you."

As the door closed after the ex-buyer, Mr. Irons carefully wiped his hands with his handkerchief. He had closed an exceedingly important episode in his business career. Finally he turned to Albert Pearsons and remarked: "The trouble with that chap isn't too much personality. Too much temperament is his trouble."

(Continued in next issue.)

Ontario Sanitary Plumbing By-laws

How the Provincial Government Can Assist the Ontario Sanitary Engineers, if a Little Voluntary Assistance is Given the Government.

WHILE it must be admitted that there is no hard and fast plumbing by-law in force in the Province of Ontario, there are certain sections in the Provincial Health Act that apply in no small way to the construction of plumbing in buildings, particularly those to be used as dwellings, and if those plumbers or sanitary engineers who are called upon to install sanitary fixtures and construct small sewage disposal systems will co-operate in a voluntary manner with the Provincial Board of Health there can be no doubt but that the medical officer of health would only be too pleased to enforce, not only the letter, but also the spirit of the law.

On pages 47, 48, 49 and 50 of the Public Health Act (chapter 58, 2 George V., 1912), schedule B, section 114, the following clauses have direct bearing upon sanitary water supply, ventilation, plumbing construction and sewage disposal. In clause 4 the following appears, which to some extent bears upon sewage disposal:

Deposits Endangering Public Health Forbidden.

4. No person shall within this municipality suffer the accumulation upon his premises, or deposit, or permit the deposit, upon any land belonging to him, of anything which may endanger the public health, or deposit upon, on, or into, any street, square, lane, byway, wharf, dock, slip, lake, pond, bank, harbor, river, stream, sewer, or water, any manure or other refuse, or vegetable or animal matter, or other filth.

Regarding insanitary cesspools, ashpits, etc., etc., the following appears in clause 6:—

Whenever it shall appear to the Local Board, or to any of its officers, that it is necessary for the preserva-

[illegible] of the public health, or for the abatement of anything dangerous or injurious to the public health, or whenever a notice signed by one or more inhabitant householders of this municipality is received stating the condition of any building in the municipality to be so filthy as to be dangerous to the public health, or that upon any premises in the municipality there is any foul or offensive ditch, gutter, drain, privy, cesspool, ashpit, or cellar, kept or constructed so as to be dangerous or injurious to the public health, or that upon any such premises an accumulation of dung, manure, offal, filth, refuse, stagnant water, or other matter or thing so as to be dangerous or injurious to the public health, it shall be the duty of the sanitary inspector to enter such building or premises for the purpose of examining the same, and, if necessary, he shall order the removal of such matter or thing. If the occupant or owner or his lawful agent or representative having charge or control of such building or premises, after having had twenty-four hours' notice from any such officer to remove or abate the same, he shall be subject to the penalties mentioned in section 33.

Every house, according to the following clause, shall have a good supply of wholesome drinking water:—

Supply of Drinking Water.

Clause 12. It shall be the duty of the owner of every house within this municipality to provide for the occupants of the same a sufficient supply of wholesome drinking water, etc., while section 14 directly bears upon the work of the average sanitary engineer who installs sanitary fixtures in a home along with a small sewage [illegible] system.

Details of Establishment of Privy Vaults, etc., to be Approved by the M. O. H.

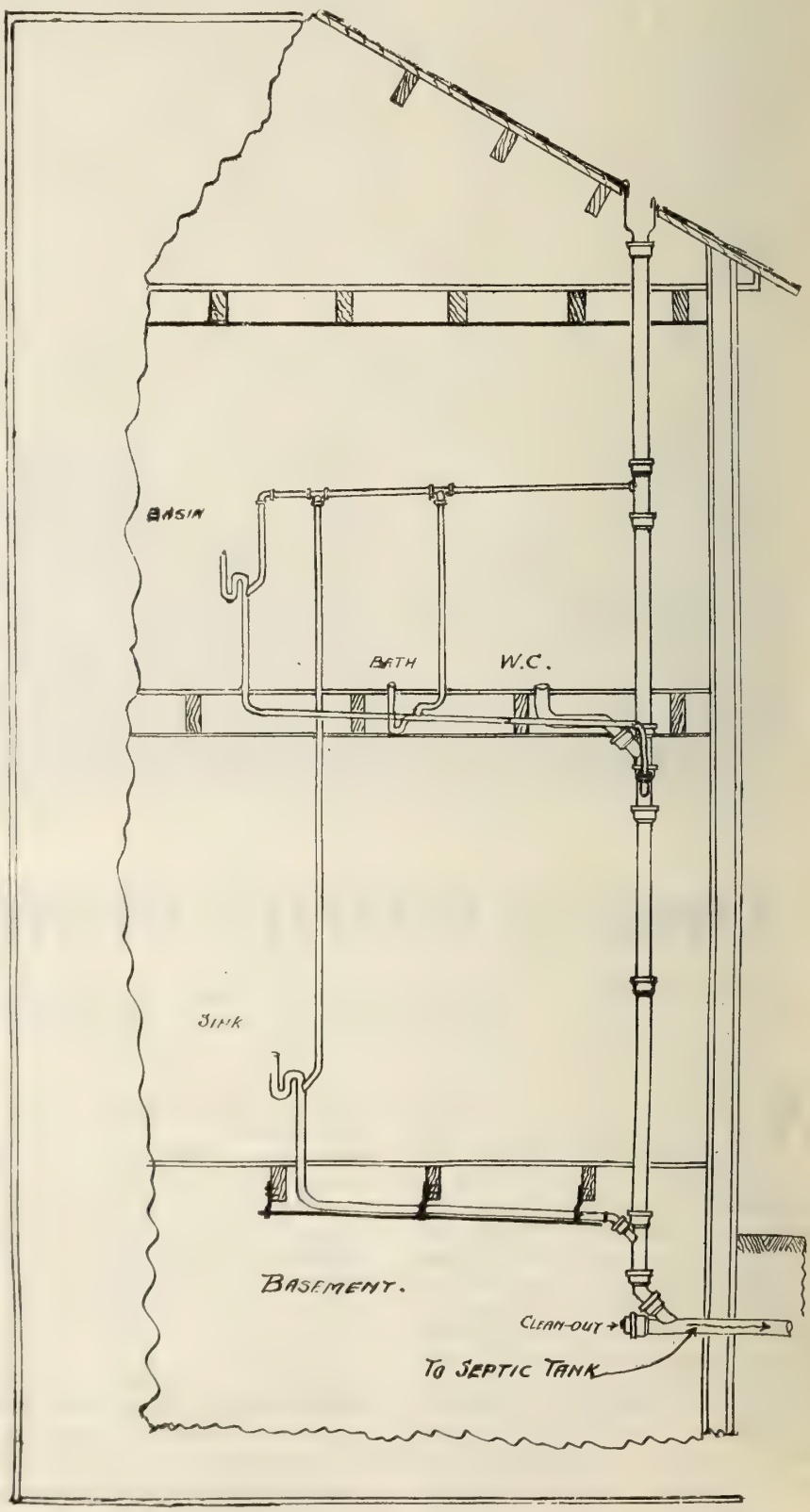
Section 14. No privy vault, cesspool or reservoir into which a privy, water closet, stable or sink is drained, shall be established until the approval, in writing, of the medical health officer has been obtained.

Again, in section 23 there is a specific law regarding house drains, vents and traps which, we may assert without fear of contradiction, is not being either carried out or enforced.

Sections 24, 25, 26, 27 and 28, too, all have a direct bearing upon the work of the sanitary engineer, and there is every reason to believe that with a little voluntary co-operation, as stated before, between the plumbing trade and the provincial health officer, much good would [illegible]

Ventilation of Drains, etc.

21. The drain of every house, connected with a sewer or cesspool, shall be properly ventilated by means of a pipe extending upward from the highest point of the main soil or waste-pipe, and also by a pipe carried upward from the drain outside the walls of the house. Such pipes shall be of the same dimensions as the main soil or waste-pipe, and shall be constructed of the same material or of stout galvanized iron, and no trap shall intervene between the ventilating pipes. If a trap intervenes between the sewer or cesspool, and the ventilating pipes, then a four-inch ventilating pipe of such material shall be carried from a point between such trap and the sewer. Every ventilating pipe shall be carried above the roof of the house, and shall open above at points sufficiently remote from every window, door, skylight, chimney or other opening leading into any house to prevent the escape into it of gases from such ventilating pipes.



24. No pipe from any drain or soil-pipe shall be connected with any chimney in a dwelling house.

Description of Drain Pipes

25. Every house drain shall be constructed of vitrified earthenware or iron pipe; and every soil and waste-pipe of iron pipe shall be rendered impervious to gas or liquids, by the joints being run with lead and caulked, or constructed of lead pipe weighing at least 6 pounds to the square foot; and the waste-pipe from every closet, sink, tub, wash-basin or other service shall have as near as possible to the point of junction with such service a trap so constructed, vented and furnished, that it shall at no time allow of the passage of gas into the house. And all points shall be so constructed as to prevent gas escaping through them.

Certain Closets Prohibited

26. The construction of any closet or other convenience which allows of the escape from it or from the drain or soil-pipe into the house of air or gas is prohibited.

Pipes Supplying Water to Closets

27. No pipe supplying water to a water-closet or urinal shall be directly connected with a pipe supplying water for drinking purposes.

Plumbing and Drainage Plans to be Filed

28. Every person who erects or causes to be erected, any building shall, within two weeks after the completion thereof, deposit with the Local Board of Health plans of the drainage and plumbing of the same as executed; and in the case of any alteration of any such plumbing or drainage, it shall be the duty of the owner of the house, within two weeks of the making of the alteration, to deposit in the same manner a plan of any such alteration; if such alteration is made by an occupant it shall be his duty to deposit or cause to be deposited the plan.

NOTE.

The accompaning drawings show the piping layout for a house of plumbing and sewage disposal system, providing the spirit of the Ontario Provincial Health Act is carried out.

By studying a few of the paragraphs in the various sections reprinted in this article, the proof of this assertion will be noted.

Of course the fact that the Act is not being rigidly enforced, makes it possible for any kind of installation to be constructed.

Our chief argument is that the Act could be carried out if a few sanitary engineers would co-operate with the powers that be, and refuse to install any work, not within the spirit of the Act, also informing the Provincial Health Department of any work done which is not in conformity with the Act.

The accompanying drawings describe what these clauses or sections of the Health Act really mean. Of course, much improvement could be effected by having a specific and a uniform provincial plumbing by-law. There should be one, and no doubt there will be at some future date.

But we are simply referring to the law as it stands, and maintains that if it were to be enforced in the spirit of the written word, there would be less material sold to inexperienced men and installed by them to the detriment of both the trade and the rural resident.

Many a rural district in Canada has in a comparatively few years become a large town, and even a city, and the plumbing installations in use very soon became a menace to the growing community.

Therefore, it cannot be denied that the sanitary and heating profession can do much in seeing to it that those portions of the present Health Act is being lived up to.

Take, for instance, that part of section 25 which distinctly states that all lead waste pipes shall be made of lead weighing 6 lbs. to the square foot, as well as lead traps and bends.

There can be no denying that lots of light lead bends are being used in the work installed in country districts, and these days a few pounds less weight per foot means a lot in the work of a whole house. Then the question of venting traps is referred to in section 25, which is not adhered to as a rule. The writer knows of hundreds of houses which have not one vent in the whole installation of plumbing. Why? Simply because it was felt that as there would not be any inspection it did not matter.

But if our provincial health department were to drop in on some such work once in a while, someone would hear about the state of affairs.

(Continued in next issue)

New Canadian Patents

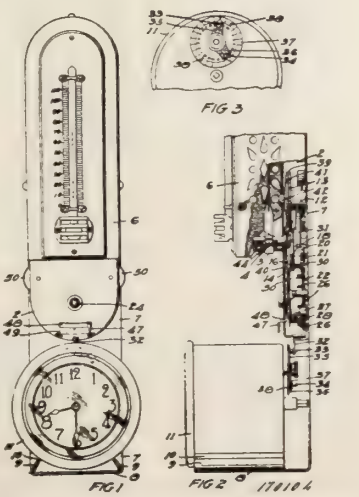
No. 170,104

The Minneapolis Heat Regulator Company, assignee of Albert P. Myer, both of Minneapolis, Minnesota, U.S. A., 13th June, 1916; 6 years. Filed 4th May, 1916. Receipt No. 265,072.

Claim.—1. The combination with a thermostat and contact posts therefor, of a spring actuated mechanism for shifting said posts, a locking latch for normally locking said mechanism, a time device having indicator hands and a dial therefor, said locking latch projecting into the path of said indicator hands to be actuated thereby, and means for moving said locking latch to clear said indicator hand when said locking latch has been moved to its released position.

2. The combination, with a thermostat and contact posts therefor, of a spring actuated mechanism for shifting said posts, a locking latch for normally locking said mechanism, a time device having indicator hands and a dial therefor, said locking latch projecting into the path of said indicator hands to be actuated thereby, and a spring connected with said locking latch for moving it to shift it from a position in front of an indicator hand to a position in the rear thereof, said spring also returning said locking latch to its normal locking position when it has been moved out of the path of the indicator hand.

3. In a thermostat, the combination with a thermostatic bar, of contact posts, a supporting plate for said posts, a shifting mechanism having a positive uniform movement and frictional engagement with said plate, stops in the



170,104. Electric Thermostat.

path of said plate for limiting the travel thereof while said shifting mechanism continues to the end of its stroke, and means for operating said shifting mechanism.

4. In a thermostat, a spring actuated gear wheel and an escapement therefor, an oscillating plate connected with said gear wheel, a second plate mounted on said first-named plate to be operated thereby, contact posts mounted in said second plate, a thermostatic bar mounted between said posts, means for limiting the stroke of said second plate, and means for releasing said gear.

5. In a thermostat, a spring actuated shifting mechanism, a frictionally held plate and contact posts mounted thereon and actuated by the movement of said shifting mechanism, stops mounted in the path of said plate for regulating the stroke thereof, means for normally locking said shifting mechanism, means for automatically tripping it at predetermined periods, said frictionally held plate having means for shifting it manually independently of said mechanism.

6. In a thermostat, a spring actuated gear having pins mounted at uniform intervals in the face thereof, a latch having means projecting into the path of said pins for locking said gear, said latch having an oscillating movement to release said gear and provided with means for yieldingly holding it in the path of said pins, a time device having means for tripping said latch to release said gear, contact posts and a supporting member therefor operatively connected with said gear, said connections permitting the movement of said contact posts to be checked at any point in the travel of said gear.

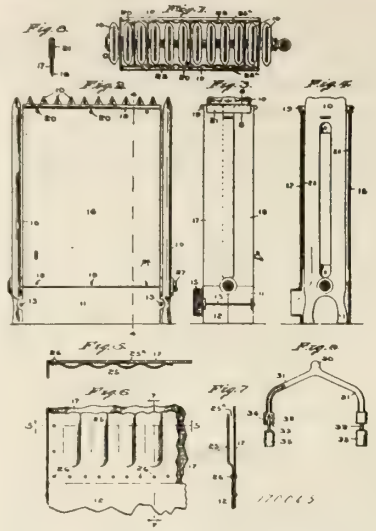
No. 170,065.

Clarence C. Shipp, Indianapolis, Indiana, U.S.A., 6th June, 1916; 6 years. Filed 24th March, 1916. Receipt No. 263,298.

Claim.—1. A shield for encasing steam radiators, comprising two adjustable members, sheets secured to the inner walls of said members to form pockets for storing a determined supply of water, and means actuated by a reduced water level in the pockets for automatically restoring the amount of water lost by evaporation.

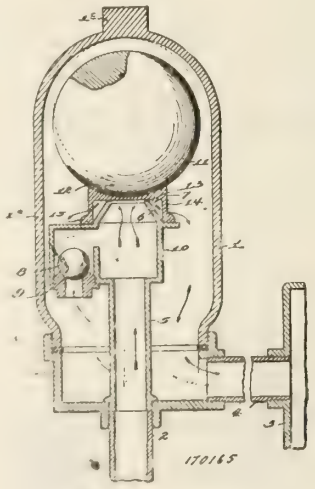
2. A shield for encasing steam radiators, comprising two adjustable members, means for holding the overlapped ends of said members in adjusted position, sheets secured to the inner walls of said members to form pockets for storing a determined supply of water, and means actuated by a reduced volume of water in the pockets for automatically restoring the amount of water removed from the pockets through evaporation.

3. A shield for encasing steam radiators, comprising two members, corrugated sheets secured to the inner walls of said members to provide pockets for storing a determined supply of water, and means actuated by a reduction in volume of stored water for restoring the amount of water evaporated from the pockets.



No. 170,065. Radiator Shield.

4. The combination with a steam radiator, of a shield comprising a radiator encasing member, means arranged on the inner wall of said member to provide a pocket for storing a determined supply of water, a water conductor means connecting said pocket with the interior of the radiator for conducting water to said pocket, and means actuated by the rise and fall of the water level in the pocket for starting and stopping the flow of water through water conductor means.



170,165. Valve

No. 170,165.

Edmund Franklin Gebhardt, Easton, Pennsylvania, U.S.A., 13th June, 1916; 6 years. Filed 27th April, 1916. Receipt No. 264,777.

Claim.—1. A relief valve organization comprising a casing having separate inlet and outlet connections a pipe within said casing forming a continuation of the inlet connections and having at its upper end a valve seat which functions as an outlet into said casing, a main valve normally closing the outlet at the upper end of said pipe and being positively centered with relation to said seat, the main valve having a concave upper face, and a spherical weight resting upon the main valve and conformably seating upon said concave upper face, the width of the casing being so selected that the weight has normally no contact with the casing and displacement of said weight in any lateral direction as far as the center of said valve is prevented by the wall of the casing which surrounds said weight.

2. A relief valve organization comprising a casing having separate inlet and outlet connections, a pipe within said casing forming a continuation of the the inlet connection and having at its upper end a valve seat which functions as an outlet into said casing, a main valve normally closing the outlet at the upper end of said pipe and being positively contered with relation to said seat, and a spherical weight resting upon the main valve, the width of the casing being so selected that the weight has normally no contact with the casing and displacement of said weight in any lateral direction as far as the center of said valve is prevented by the wall of the casing which surrounds the said weight.

3. A relief valve organization comprising a casing having separate inlet and outlet connections, a pipe within said casing forming a continuation of the inlet connection and having at its upper end a valve seat which functions as an outlet into said casing, a main valve normally closing the outlet at the upper end of said pipe and being positively centered with relation to said seat, and a spherical weight resting upon the main valve, the width of the casing being so selected that the weight has normally no contact with the casing and displacement of said weight in any lateral direction as far as the center of said valve is prevented by the wall of the casing which surrounds said weight, said valve seat consisting of a flange formed as a truncated cone and the said valve engaging said flange with its under face and having an extension surrounding the flage and adapted to engage upon the upper face of said pipe.

A GOOD FOUNDATION

"Public health is the foundation upon which rests the happiness of the people and the welfare of the state.—Disraeli.

THE SANITARY ENGINEER

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HIGH COST OF LIVING

ALMOST every paper under the sun has had something to say about the high cost of living. None have arrived at anything near a solution, and it will no doubt require a lot of hard thinking before so important a problem can be properly solved.

Time will work the greatest wonder in this respect.

But what are sanitary and heating engineers doing in the matter? How are they more than ordinarily interested? Let us review past events, past arguments, etc., which have been advanced during the last few months. What kind of lines do mostly affect the cost of living?

Wheat, oats, meat, wool and cattle raising generally is the basis of all our foodstuff and clothing. Are not these the very things which cost the most? Certainly. Very well, the next question is, are the producers getting more than they did in normal times? Of course they are. Does it cost these producers more to produce than the prices being paid now by the consumer? Investigations prove that the producer is getting a larger proportion than he has been doing, but can he be blamed altogether? We think not.

For instance, a farmer has a lot of hogs. There is a shortage on account of abnormal demands. One buyer bids against another in his endeavor to get these hogs, simply because his customer in turn must procure a constant supply. And the same argument holds good with wool, wheat, etc.

Thus it can easily be seen that the producer, the farmer, has been and is getting more money. Furthermore, bank statistics show that farmers have greater deposits. Such being the case he should be and is a more desirable customer than in times past.

A few years ago the farmer and rural resident could not have procured all city conveniences, be the price ever so low, but to-day he can be furnished with every single appliance that can be had in a city home without a single exception. And what is more, the real cost is actually less than in a city. Such a statement may sound rather strange, but it is nevertheless true. On another page we show figures that go to prove its truth.

Now, assuming that the farmer and rural resident is richer in wealth, it is the duty of the ordinary industrial tradesmen to cater more to the wants of the farmer. Show him how he can live better, enjoy all the comforts and conveniences of a city, and more. Show him that money is poorly invested if only making 3 per cent. True wealth does not necessarily consist of big banking accounts, but rather in active circulation, and sanitary engineers can do their part by giving the farmer more of the things we produce for the things he produces, or the proceeds from those goods he produces.

COST OF DOING BUSINESS

NO subject has been more discussed in the written work and personally than has that of the cost of doing business, and we venture to say that until certain laws are brought into force, there will be no rest.

Cost, cost, cost. What form does cost take? It takes all manner of forms, and ever will. Cost many times counts in the extra hours a person has to put into his business. Probably ninety per cent. of the human race, is striving 10 hours a day that they may enjoy at leisure a few years later on, and 80 per cent. of the 90 never reach the age of 60 years. That's cost in one form.

Another form of cost is lack of home life interest. Sons and daughters left "to grow" like Topsy of Uncle Tom's Cabin fame. They want parents and particularly fathers to lead and show that life is not one big weary drag. Boys these days are going to college, are under the impression that a college education is all, and truly the road to a soft job. They, too, will count the cost.

What we want is a new insight, a new view of work, a greater knowledge of cost not only financial cost, but moral, mental and physical cost. We may be quite sure that if we get something to all appearance for nothing, or for less than its value, that we will pay the cost some time, somewhere and somehow.

Every thing in the world costs, and we should therefore study well, at least, the cost of doing business.

EDITORIAL BRIEFS

USE THE brains and mental skill of the returned soldier.

BY SO doing make him a brilliant asset instead of a liability.

GET out into the open. Sell goods and sell service. AND before selling either arrive at the cost of both.

SERVICE often requires years to develop, why give it away?

A Plea for Strict Plumbing Codes

Control of Plumbers By Water Works Departments Suggested—No Doubt More Uniformity Should be the Rule

By Dr. Wm. Paul Gerhard, C.E., New York City, author of "The Water, Sewerage and Plumbing of Modern City Buildings," and other standard books on sanitary subjects.

Why Are Plumbing Codes Required?

I am a firm believer in the good results brought about by the enactment and enforcement of plumbing codes. I have lived to witness the vast improvements which have taken place in the past 35 years in the character of the plumbing work as executed in all classes of buildings, and I can unreluctantly state that these improvements are due perhaps more than to any other cause to the introduction of an official and honest supervision of plumbing by either municipal authorities or by water departments. The art and craft of plumbing has made wonderful advances, and credit for this also belongs, in part, to respectable and first-class plumbing firms to be found in every city or town, and to the local and National Associations of Master Plumbers. But, as in every herd of white sheep there may be found some black sheep, so there are plumbers and plumbers, and it must be said, sad though it is, that some men in the trade do not know how, or if they know, do not wish to carry out a contract honestly and creditably whenever a chance offers to "scamp the job." Therefore, to prevent imperfect work, plumbing must be inspected. My experience has been that the best men in the trade do not object to such inspection, for it rather protects them against unscrupulous competitors. House-owners, as well as tenants, should likewise welcome the introduction of a code, for it secures to them good and reliable work, and affords protection against leaks or other plumbing troubles, due to careless or incompetent mechanics.

Licensing Plumbers

Plumbing codes require all persons working at the business of plumbing, whether as a master or as a journeyman plumber, to have a certificate of competency, and to be registered.

To establish such competency and registration a Board of Plumbing Examiners is created, before whom applicants appear for examination. The board decides their qualification to engage in such business, and either approves or rejects their application.

The examinations may be oral, or written, or both, and should be primarily of a **practical** character. An elementary examination usually proves to be sufficient, provided it is strictly and honestly carried out.

The Board of Plumbing Examiners should consist of at least three, and preferably five members. One of these should be a master plumber, another a journeyman plumber, both to be appointed by the Mayor, under approval of the City Council. The other members should be preferably officials of the water and sewer departments or the city engineer's bureau, or a member of a Chapter of the American Institute of Architects. The board should hold regular business meetings, institute the examinations, and issue licenses, and keep a register of names of firms having a license. The secretary of the board should keep all records, books, plans, specifications, and other papers. He should be a municipal officer, or he may be the superintendent of the water department.

All licensed plumbers should be required to execute a bond for the faithful performance of their work, the amount of the bond varying. All plumbing should be done only after filing plans and specifications and obtaining a proper permit from the board, except in case of repairs of leaks, when no plan is required.

The plumbing inspectors appointed by the board should be selected only with reference to their fitness for the position; political favoritism should be disregarded. Only by a strict adherence to this rule can an efficient corps of inspectors be maintained.

Licensing Drain Layers

In some cities the drain layers, who make the house connections with the public sewers, form a distinct class of tradesmen. In that case they should also have a license.

Certificates of Inspection

When the plumbing work in a building has been completed, tested and inspected, the board issues to the plumber, upon his request, a certificate of inspection that the work has been properly performed as required by the provisions of the code. To make such a certificate of value to the owner of a building, it should have the signature of the plumbing inspector and of the secretary of the Plumbing Board.

What City Department Should Control Plumbing?

There are other municipal departments besides the health and building departments who are interested in the plumbing code, such as the waterworks, the sewer, the city engineer's or city manager's and the fire departments.

According to one statistical inquiry, it was found that out of 117 cities, 100 had the plumbing code administered by the health department, 8 had the plumbing code administered by the department of buildings, 1 had the plumbing code administered by the Sewer Commissioner, 1 had the plumbing code administered by the water department, 4 had the plumbing code administered by independent departments, and 3 had the plumbing code administered by the Department of Public Works or city engineer's office.*

Much may be said in favor of having the plumbing controlled by a waterworks board or department. A good plumbing code is of inestimable importance to a waterworks department. The absolute control of plumbers is quite necessary in order that the house installations may be of a satisfactory character. This control also includes the obtaining of proper reports on the installations, which are filed in the water department's office.

In England, for instance, though the sanitary arrangements in buildings are controlled by sections of the Public Health Act, or by building acts, ordinances, or model drainage by-laws, which are very full and strictly enforced, the various private water companies have each their own set of very complete regulations as to the thickness, weight and quality of pipes and fittings to be used for service, supply main or waste.

Where, as in the case of industrial establishments, factories and workshops, or in the case of public buildings, like institutions, hospitals, etc., unusual water connections are desired for fire protection purposes, large cities require that detailed plans of the size, location and arrangement of all service pipes, valves, hydrants and fire standpipes must be filed for approval by the fire department This is an excellent rule for large cities, but in the smaller towns the same object, viz., a safe and reliable fire protection installation, can be attained by including the supervision of such apparatus in the duties of the waterworks department.

Plans and specifications, showing the plumbing layout for any contemplated building, should be filed at the office of the board for approval.

A very good paragraph for a code is that "no water at a higher temperature

*See Chapin Municipal Sanitation in the United States, 1901.

than 120° F. shall be admitted into the house sewer."

Another very important section of a code is meant to prevent obstructions and stoppages in the public sewers. It should read about as follows: "It is made unlawful to impair or obstruct the flow of any public sewer or clog up any appurtenance thereof, or place therein any substance, solid or liquid, other than the waste products for which said sewers are provided."

Every building should be separately and independently connected, both with the water main and the public sewer. Licensed plumbers wishing to have water introduced into a building should make a written application to the water department, whose officers will determine the size of the tap, the diameter of the service pipe, and whether or not a water meter will be required. A stop and waste cock should be placed on every house service to enable the water department to cut off the water and drain the pipes.

Efficiency in Waterworks Departments

The work of efficient municipal or private waterworks should not be restricted to the routine duties, which consist in providing in the city service reservoirs and in the city water mains a wholesome, germ-free supply of clear water. Such bureaus should always have a higher aim in view, namely, that of having a perfect control of the supply at the house faucets, in the house storage tanks, in the basins, bath tubs or other ablution fixtures, and even of the drinking water at the consumer's table. The water delivered to the consumers should be without color, bad odor or bad taste, and free from deposits of sediment or rust in the house pipes.

Control of Water Waste

A matter of vital interest to the water department, and no less to the taxpayers, is the prevention of all unnecessary **waste of water.** This matter becomes serious, where, owing to droughts, a shortness in the public water supply is threatened. Can it be efficiently accomplished, and, if so, by what means?

The waste which occurs in the street mains and in house service pipes, though considerable, will not be discussed here. Efficient waterworks departments have learned to cope with this question, but they should go a step further and strive to prevent waste of water from consumers' fittings and in water-takers' premises. To the average layman a slight leakage seems an unimportant matter, and he is apt to overlook the fact that the effect of slight leaks, if constant, is vastly increased by the time factor. A mere dribble from a faucet, if allowed to run on unchecked for twelve months, often amounts to more than the annual tax for water. In American cities, which are notorious water wasters, and where the unrestricted constant supply system is used exclusively, it is of the utmost importance that the waste be checked, however unpopular or unpleasant the application of waste-preventing measures may appear to be. The popular fallacy that "water should be as free as air" should be combated.

The existing water pressure has a considerable bearing upon the volume of water running to waste from defective fittings. This is another point ignored by water-takers. The popular notion that a constant small waste helps to clean the soil pipe, the house drain, the street sewer, is a fallacy. Hydraulic engineers know that for effective "flushing," sudden large discharges are required, and that small dribbles accomplish no good results whatever.

While waste of water, due to badly constructed apparatus or fittings, or to defective workmanship, can and is prevented by the department's plumbing supervision, where the department has the power to regulate by code the character, strength, and arrangement of pipes, faucets, tanks, cisterns, filters, boilers and plumbing fixtures, much of the waste going on in buildings is under direct control of the consumers. Waste caused by faucets, **carelessly** left running and waste due to **wilfully** keeping faucets open are equally bad. Then we have another waste, due to running water off from the hot water faucet in cases where a circulation pipe is omitted. Still another is the wilful running of faucets to get, in summer, cool water for drinking; sometimes it is caused by a cold water pipe being in contact with hot water or steam pipes, or by its being carried near a kitchen or laundry or boiler room ceiling, where much heat accumulates.

Consumers are likewise responsible for hidden wastes from underground broken service pipes. Then there is the waste due to ordinary wear and tear, caused, for instance, by worn-out washers in faucets or tank ball cocks.

Fittings in private houses are much more difficult to control than those in public or semi-public buildings. Hence the water department should have proper authority to enforce a penalty for neglect of the water fittings, and also for wilful waste. In many cities and towns this is quite a customary measure of prevention.

Waterworks Rules and Regulations

All well-organized and efficient municipal or private waterworks departments issue a set of rules and regulations governing the use of water. These rules must be explicit and be impartially enforced. Some of the points to be covered are:

Taps and service pipes to be of size prescribed by the water department. They shall be run into the buildings only by licensed plumbers, who must file an application, stating the material to be used, the connection to be inspected before being covered up to guard against poor workmanship or imperfect fittings.

All water-takers are required to maintain the entire inside water system in good condition and repair. They shall also protect all pipes and fixtures from freezing.

Where the water is metered, the licensed plumber shall obtain a meter, which has been tested, inspected and approved by the department. A water meter, to fulfil its purpose, must be entirely accurate and durable, but also so sensitive as to register small volumes of flow.

A further precaution to prevent waste of water consists in the annual reinspection of all water fittings by a water department inspector. The suggestion has been made—and it is a good one, though it may conflict with "union rules"—that the inspector should provide himself on his tour of inspection with a tool kit, so as to be able to perform quickly small repairs free of charge. A similar policy has for many years been followed by wide-awake and progressive companies.

In the annual reinspection the employees of the water department will be aided considerably if there is filed at the office and readily available for quick reference a record plan, showing the position in the building of every pipe, cistern, faucet, trap and fixture. Future additions, alterations or changes should, as a matter of course, be also recorded.

CANADA'S TYPHOID BILL

If figures are true and particularly those which appeared in the November issue of *Conservation*, Canada is losing over fourteen million dollars a year in cash and earning power of the victims of that fell disease typhoid. Why? Contamination of her waters.

Tuberculosis Cost

She is losing twice that amount, more per annum because of tuberculosis, Why? Pollution of air, bad ventilation; no laws to govern ventilating of our buildings.

All the money spent upon hospitals for consumptives is insufficient and always will be so long as the Canadian people are allowed to commit suicide by closing up the houses they live in, erecting warm air furnaces that roast all the vitality out of the air, furnishing little or no humidity. Awake sanitary and heating engineers. Awake. Sound the alarm this coming winter at your meetings. Be leaders and be heard.

PRACTICAL SHEET-METAL WORK

BY THOMAS STANFIELD

ARTICLE V.

IN previous articles of this course the problems taken up have only required the use of a compass and rule. It was not even necessary to have a drawing board.

In this article it will be necessary to procure and use a drawing board. A T square and a number of triangles of various degrees, as well as the compass.

Fig. 1. To Divide a Circle Into Four Equal Parts

First draw a circle, and with the T square draw a line through centre of circle as shown. Now take the triangle which by the way is a 90 and 45 degree triangle, A being the 90-degree angle and BC the two 45 degree angles, by allowing AC to rest along edge of the T square, the line CD may be drawn thus dividing the circle in four equal parts.

Fig. 2. Divide Circle in Eight Equal Parts

Having divided the circle, Fig. 1, into four parts, the triangle may now be used in another way, by using the angles CB, and placing the triangle in the position shown, always cutting the circle at centre in every case.

Fig. 3. Divide Circle Into Six Equal Parts

Draw another circle and make use of another kind of triangle, that of a 60 x 30 degree triangle. By allowing this triangle to rest against the edge of the T square and cutting the circle at the centre alternately, the circle will be divided into six equal parts.

Fig. 4. Inscribe a Hexagon in a Circle

Draw another circle, follow out instructions given in Fig. 3, and join the various points developed as shown by using the same triangle. This will complete the desired hexagon.

Fig. 5. Divide a Circle Into Three Equal Parts

First draw a circle. Now draw three lines from centre to cut the circle at different points by placing the same triangle as used in Figs. 3 and 4, the parts A B C will be equal.

Fig. 6. Inscribe an Equilateral Triangle in a Circle

To work out this problem, draw a circle, and follow out the instructions given to describe Fig. 5. And, by again using the same triangle it will be found that the points will be in true alignment with each other and simply require to be joined, thus forming a true equilateral triangle.

Fig. 7. Divide a Circle Into Eight Equal Parts by Using a 22½ x 67½ Degree Triangle

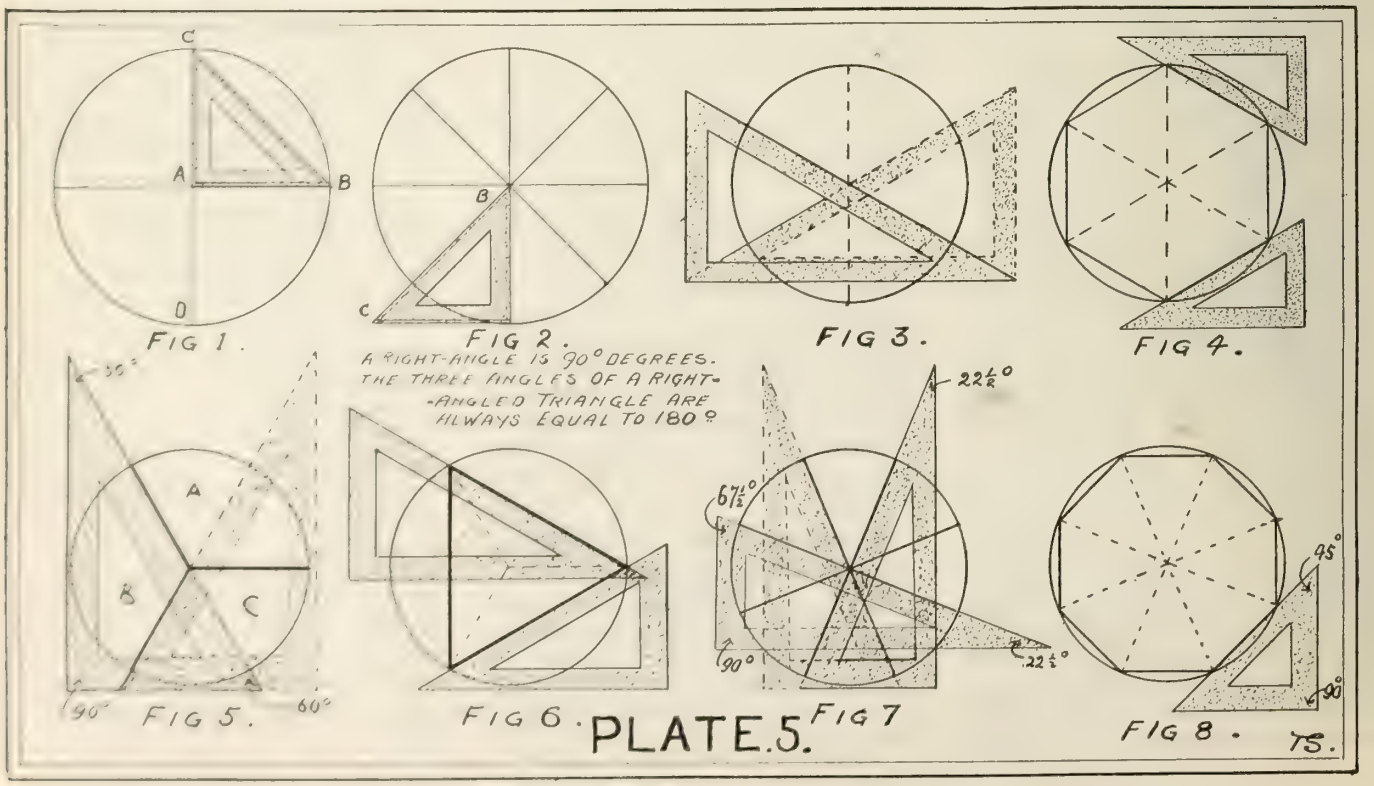
Draw a circle, and by placing the 22½ x 67½ degree triangle in the various positions shown, then drawing lines through centre of circle, the circle is divided into eight equal parts.

Fig. 8. Inscribe an Octagon in a Circle by the Use of Triangles

First draw the circle, then follow out the instructions previously given in Fig. 7.

Then take a 90 x 45 degree triangle and join all the points shown on circle by the dotted lines. This will complete the desired octagon.

(Continued in next issue.)



Market Conditions and Tendencies

Statements Regarding the Prices and Trend of Supplies.

THE MARKETS AT A GLANCE

The tendency of prices is still upwards and several important price changes have taken place since last issue. Lap and buttweld pipe have again advanced on most sizes, being the third advance within a month. Some lines of valves have also increased in price. Ingot metals are all firmer, and the tendency is reflected in manufactured products. The lead market has shown considerable increased strength of late. Many sundry lines which are used by plumbers or enter into the manufacture of supplies have scored further advances.

TORONTO, Nov. 30.—Many price changes have been recorded in materials affecting the plumbing trade during the time intervening since last issue. Valves have been advanced, lapweld and buttweld pipe have again climbed upward, and waste has also been marked higher. Wholesalers report a good trade in steamfittings of various kinds, which would seem to indicate that industrial building is proceeding apace. In the building of houses there has been a small trade. There seems small prospect of lower prices in the near future in any of the lines affecting the plumbing trade.

Globe, Angle, Check and Radiator Valves Are Up

VALVES.—Advances have been recorded in selling price of globe, angle, and check valves in both the standard and high grade. In the instance of the standard, the new discount is 30 per cent., as compared with 35 at recent quotations, and 25 per cent. for high-grade, as compared with 30 per cent. formerly. In the standard radiator valves there has also been an advance, the new discount being 40 per cent., as compared with 45 per cent. formerly. In the high-grade radiator valves the new discount is 30 per cent., whereas the former discount was 35 per cent. Patent quick opening valves have advanced in price by reducing the discount from 65 per cent. off list to 60 per cent. off list. There has been a good demand within recent weeks for steam fittings, which would seem to indicate that industrial development of various kinds is keeping up. Indications seem to point to steady prices, with a tendency to firmness. Further advances are not considered improbable in the face of market conditions. Experienced mechanics continue to be a scarce commodity, and this is adding to the difficulties of valve makers. Following is the new range of discounts:—

	Per Cent.
Ground work	50
Compression work, standard	60
High grade	53
Cushion work	45
Fuller work, standard	59
High grade	52
Basin cocks, No. 0, standard	58
High grade	52
Nos. 1 and 2, standard	54
High grade	46
Bath cocks	60
Flatway stop and waste cocks, standard	58
High grade	35
Roundway stop and waste cocks, standard	58
High grade	55
Steam cocks	25
Globe, angle, and check valves, standard	30
High grade	25
Radiator valves, standard	40
High grade	30
Patent quick opening valves	60

Soil Pipe and Fittings Hold at Firm Prices

PIPE AND FITTINGS.—Demand for soil pipe and fittings is reported somewhat light, due to the absence of any extensive building operations. Prices for this commodity have held firm since last issue. With any considerable demand present prices would soon be back numbers. So long as present conditions prevail in the manufacture of pipe of all kinds there is small prospect of any easier quotations. Following the the quotations:

	Per Cent.
Medium and extra heavy pipe up to and including 6 in.	60
8-inch soil pipe	45
Medium and extra heavy fittings up to and including 6 in.	65

Lapweld and Buttweld Pipe Record Advances

WROUGHT PIPE.—Advances in both lapweld and buttweld pipe have been recorded since last issue. This makes the third advance that has taken place in this pipe during the month. The market in this commodity is very firm at present prices and other advances in the near future would not be improbable. On the ⅛-inch size the price remains the same as at recent quotations, but all other sizes have changed. Following is the new list of prices per 100 feet for Ontario, Quebec and the Maritime Provinces:

	Per 100 ft.	
Buttweld—	Black.	Galvanized.
⅛ in.	$ 3 50	$ 5 00
¼ in.	3 30	5 43
⅜ in.	3 30	5 43
½ in.	4 25	5 82
¾ in.	5 18	7 30
1 in.	7 65	10 80
1¼ in.	10 35	14 61
1½ in.	12 38	17 46
2 in.	16 65	23 50
2½ in.	26 33	37 15
3 in.	34 43	48 58
3½ in.	43 24	60 26
4 in.	51 23	71 40
Lapweld—		
2 in.	19 24	25 72
2½ in.	28 67	38 90
3 in.	37 49	50 87
3½ in.	46 92	63 94
4 in.	55 59	75 76
4½ in.	64 77	88 27
5 in.	75 48	102 90
6 in.	97 92	133 40
7 in.	130 90	174 90
8 in. L	137 50	183 80
8 in.	158 40	211 70
9 in.	189 80	253 20
10 in. L	176 00	235 20
10 in.	226 60	302 80

Prices for Ontario, Quebec and Maritime Provinces.

Bathtubs and Sinks Go Up; Range Boilers Hold

BOILERS AND ENAMELWARE.—Range boilers have held firm in price during the past two weeks, no further advances being recorded in that time. The demand is somewhat limited. In bath tubs and sinks an advance has been put into effect. In fact, the prices for all enamelware are in a very movable state. All prices have been withdrawn

by the manufacturers, who will give quotations only on request. This condition must necessarily prevail with the jobbers, who will not guarantee their price for any length of time whatever. In the roll-top bath tubs, in sizes 4½ feet to 5 feet, and in width from 24 to 30 inches the new price at the time of writing was $20.10. In roll-top sinks, 18 inches by 30 inches, the quotation given is $10.50. We quote:

30-gallon range boilers, standard	$10.00
30-gallon range boilers, extra heavy	12.50
Bathtubs, roll-top, 4½ ft. to 5 ft. 24 to 30 in. wide	20.10
Sinks, roll-top, 18 x 30 in.	10.50

Wiping Solder And Bar Solder Go Up

LEAD AND SOLDER.—There has been an advance in wiping solder from 2c to 3c per pound since our recent quotation. Wiping solder is now quoted at 25¾c to 29¾c, as compared with 23¾c to 26½c formerly. Bar solder has also recorded an advance, the price being the same as for wiping solder. On commercial bar solder the price is 25¾c and on guaranteed 29¾c per pound. Lead sheets hold at the same quotations as given in our recent issue. Lead wool is quoted at 7½c per pound. Following are quotations:—

Lead pipe	$0.13
Waste pipe	0.14
Traps and bends, disc. off list	10%
Wiping solder	25¾-29¾
Bar solder, commercial	0.25¾
Bar solder, guaranteed	0.29¾
Lead Sheets:	
3 lbs. sq. ft., per 100 lbs.	11.75
3½ lbs. sq. ft., per 100 lbs.	11.75
4 to 6 lbs. sq. ft., per 100 lbs.	11.50

Cut to sizes, 75c extra per 100 lbs.

Sundry Lines Go To Higher Levels

WIRE NAILS, ETC.—Another advance of 10c per 100 lbs. in the price of wire nails makes the new base price $4.20 Toronto. Cut nails have advanced 30c per 100 lbs. and are now quoted at $4.00 base.

Bright and brass wire goods have advanced during the past week, as has copper wire, escutcheon pins and rivets.

Tarred and untarred hemp rope has advanced 5c per pound. Several advances were made during the week on iron and steel in various grades and shapes.

Ingot Metals Higher Market Very Strong

COPPER.—Copper has advanced to-day following the recent advances and strong market in the United States. Reports from New York state that since Nov. 1 producing interests have booked orders for about 5,000,000,000 lbs., or in other words the production at present enormous capacity for 2½ months. The prices named for third and fourth quarters in 1917 are the highest ever touched for such positions. Excitement has been running high in the copper market. Locally the price is 37½c-39c, showing considerable advances over previous quotations.

Tin Reaches Higher Levels

TIN—Tin is much firmer in price, following a firmer market in the United States. Reports state that the British Government has taken over considerable further steam tonnages from India and the East Indies. Freights in consequence have advanced from 25 to 30%. November arrivals of tin have been very small at New York. Locally the price has advanced to 48c-49c.

Spelter Goes Higher

SPELTER—Spelter is strong and higher in both the New York and local market. A recent decline in London, Eng., apparently did not affect the situation in America. The zinc ore market has advanced another $5 ton. Locally, the price is 15c lb.

Lead is Firmer

LEAD—The consumption of lead continues heavy. The market, however, was dormant for a period, but has become more active. The American market is firmer and higher prices are being asked for futures. The price locally remains at 9¼c lb.

Antimony Slightly Firmer

ANTIMONY The market is showing some signs of further strength, due, it is claimed, to the placing of some further orders for shrapnel in America. The price locally remains unchanged at 18c lb.

ALUMINUM—The market is quiet and prices are unchanged locally, at 68c lb. This metal sold at 18c to 20c lb. for a year prior to the war.

Solder Up 1½c Pound

SOLDER Prices are higher following the advances in tin and spelter. Prices have advanced 1½c lb. Guaranteed is quoted at 31½c. Strictly pure is quoted at 29c.

Pig-Iron Up $1 Ton

PIG-IRON—Pig-iron has advanced another $1 ton. Hamilton and Victoria Brand is quoted at $32.00 ton. The market in the States is very sensitive and some producers are practically sold out for 1917.

Red Lead and Oils Firm in Price

RED LEAD, OIL, ETC.—White and red lead remain firm at the recent high prices. With decidedly firm and even higher prices prevailing on pig lead, there appears to be little likelihood of a decline in the immediate future. Linseed oil in barrel lots is quoted at prices ranging from $1.10 to $1.20. The market on oil is strong at present.

Waste Goes Up From 1c to 4c Per Pound

WASTE.—An advance in all classes of waste, ranging from 1c to 4c per pound in certain instances went into effect during the week. Polishing waste has advanced 2c per pound and white wiping waste 1c per pound on all the various grades. Colored wiping has advanced from 1c to 1½c per pound. Wool packing waste has made the greatest increase, the first quality of this article now being quoted 4c per pound over the previous quotations. The lower grades of this waste have advanced 1c and 2c per pound. White washed cotton wipers is the only line that has not advanced, that line being still quoted at 12c. Mixed colored and dark colored have in each instance advanced 1c per pound. The advance has been caused through the firmness and advancing prices in the raw cotton market. Raw cotton is now being quoted dangerously near 21c per pound and has been hovering in that neighborhood for some time past. Manufacturers of waste report a big demand for the product, some factories being sold up to their capacity. Following are the quotations:

	per lb.	$
Cream polishing waste	$0.20	$
White wiping wast	0.14	0.18
Colored wiping waste	0.09	0.14
Wool packing waste	0.11	0.24
Washed cotton wipers	0.09	0.12

Plumbers' Oakum Holds Steady in Price

OAKUM.—The demand for oakum from the Eastern section of the Dominion continues good. In Ontario the demand is fair. Prices have held steady during the past two weeks for all kinds of oakum. The following are quoted:

	per lb.
Plumbers' spun oakum	$0.08
U. S. Navy (English)	0.15
New Hemp (English)	0.15
U. S. Navy (American)	0.18½
Best American	0.19½

Humidity and Its Importance

I. Physical Properties of Air and Moisture (Humidity)—II. Instruments for Measuring Humidity—III. The Effect of Humidity on Health and Comfort—IV. Apparatus for Artificially Increasing Humidity in the Air.

By Consulting Sanitary Engineer.

MANY books or pamphlets on the subject of humidity are quite explicit as to the reasons why moisture in the air is necessary but fail to explain how this may be reasonably accomplished.

The following devices for increasing humidity have come to the writer's attention:—

(a) Steam or Hot Water Heating:—

1.—Placing wet cloths or soaking towels over the radiators and renewing when dry.

2.—Placing and keeping full pans of water on the radiator as shown in Fig. 6. This illustration is taken from a pamphlet of the Canadian Association for the Prevention of Tuberculosis and is entitled "Simple Methods of House Ventilation in Winter." "Where steam heating is used, the method illustrated of bringing outer air by a 2-inch opening the width of the window, to be warmed by passing down and up by means of a diaphragm through the radiactor, is very effective. It may similarly be used with hot water heating, due care being exercised in very severe weather. The air is drawn in by a small fan in room near ceiling, or in the adjoining hall."

3.—A combination of (1) and (2). Cloths with one end in pans of water are hung over the radiator. The water by capillary attraction tends to keep the cloths wet and the heat of the radiator evaporates the water from them. Over steam radiators the cloths are sometimes dryed out faster than the water can by capillary action flow from the pans and the cloths are scorched. From actual observation last winter, the humidity of a large office was only increased to 40 per cent. by such means.

(b) Hot Air Furnace:—

1.—Stuffing wet sheets in the registers.

2.—Hanging wet sheets in the bedrooms.

3.—Placing shallow pans inside the register faces.

(c) Any Heating System:—

1.—Placing an electric light bulb or heater in a pail of water. This replaces the kettle on the stove heater.

All these means for artificially increasing humidity, some of which are fairly efficient, are however really unscientific and unsightly make-shifts that require varying amounts of attention. The great need to be supplied is an automatic, efficient though inexpensive means of increasing the humidity to a healthful state.

The most positive way of increasing humidity of air is by injecting steam into it. Depending on this principle Fig. 7 shows a humidifying device for hot air furnaces patented in the United States, February 17th, 1914, by George Garrecht. The amount of water is automatically controlled. Only coal has to be daily supplied to the furnace.

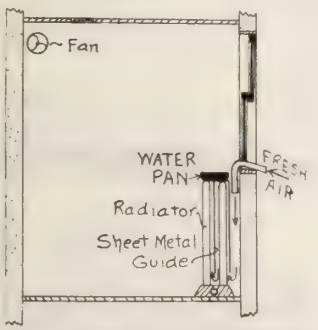


FIG. 6 – HEATING VENTILATING, HUMIDIFYING

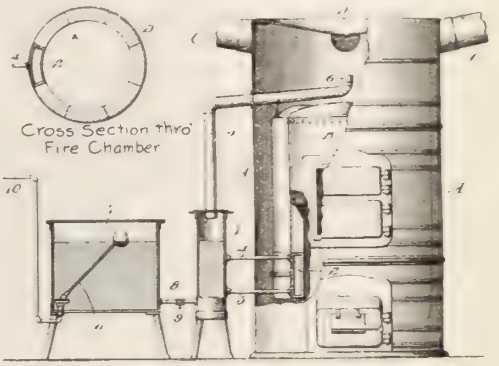


FIG 7 – AUTOMATIC HUMIDIFYING DEVICE (HOT AIR HEATING)

Another means of increasing humidity in a hot air furnace is by placing near the fire pot plates of silica and sand made under a patented process. These plates are very porous readily inducing evaporation of water from them. By this means about 8 gallons of water in a day has been evaporated.

For some years Dr. P. H. Bryce, Chief Medical Health Officer of the Department of the Interior, has had installed in his own home a system of his own design somewhat similar to that shown in Fig. 7 but applicable to any heating system. He also provides at the same time a means of bringing fresh warm air into the house. The writer was recently afforded the opportunity of inspecting the apparatus shown in Fig. 6 which is largely drawn from memory. The Doctor's description of this novel yet simple plant as given in "Domestic Engineering" is as follows:—

Various methods for maintaining humidity above fifty per cent. have been attempted, but that which has proved quite adequate in the following which may be attached to any hot air, hot water, or steam heater, (Fig. 8). It has for several winters been capable of automatically maintaining a relative humidity constantly of between 50 and 55 per cent. The apparatus consists of (a) a hollow casting or a series of pipes coupled together and placed over the fire beneath the sections of the boiler with the inlet pipe attached to the public water supply through an ordinary closet tank, set in the cellar at such a level as to just keep the heating reservoir filled. (b)—The exit pipe leads directly to the flower room or other convenient place in the house, where it delivers steam directly and through the law of expansion of gases diffuses itself throughout the house, so that everywhere the percentage of humidity is practically the same. The automatic character of the water supply regulates nicely the moisture in the house, because, if the weather outdoors is cold and dry, the amount of heat required is greater, the fire burns brighter and the evaporation is more; while, if the outer atmosphere be mild and consequently holds more moisture, the fire will be burning less brightly and the amount of water evaporated will be proportionately lessened. It is desirable in order to make such a system effective that means be provided for introducing fresh air constantly into the house along with the moisture to maintain the sensation of freshness associated with moving air. It is found possible to warm outer air by passing it through a chamber in tubes which are surrounded by the steam as it moves towards the flower room, since, as the air is warmed, its capacity for moisture increases, and

when the two are mingled they pass into the house atmosphere without any precipitation of moisture whatever.

Many minor details may be required according to the size of the house and the extent of the task to be performed, but the system is readily applicable both to large or small houses, and experience has shown that it will everywhere perform its work.

Before concluding this article it is only fair to mention that Prof. Carpenter, highly regarded as an authority on heating and ventilating matters, is not, in his book on "Heating and Ventilating Buildings" in full accord with all the opinions that have been expressed. He admits that "the air should be from 50 to 70 per cent. saturated in order to feel pleasant, and be of the most value for ventilating purposes." With regard to school house warming and ventilation he also states that in the winter when the outside air is warmed to 70 degrees Fahr. without increasing the moisture which it contains "the skin and mucous membranes of the mouth, throat and nose, and the moist surfaces of the eye and ear, are more or less affected, in some persons with irritating and even serious results."

He considers other effects of dry air, however, hygienically advantageous, is not in accord with what he terms "the irrational position assumed by humidity hobbyists" and points to the generally fine physical appearance and evident good health of thousands who spend their school life in the relatively dry air of otherwise well ventilated buildings.

"To give an out of door June humidity" to the rooms during the school year would he estimates involve an expenditure of from ½ to 2-3 the cost of warming them.

To these objections the information brought out in this short series of articles would seem to answer that it must be in spite of, and not on account of, the lack of humidity that some healthy school children remain so. And that any building whether it be the school, theatre, church or home is no fit place for any human being if the humidity is not of the proper amount.

Whatever the cost, there is as much reason for having a healthful and comfortable humidity as there is for having a comfortable and healthful temperature. But in regard to the estimated increased expenditure for coal the Professor overlooks the fact that as the temperature may be 10 degrees lower with comfort, given a proper amount of humidity, that possibly ¼ of the coal bills might in the first place be saved by reducing the temperature. There is in most buildings, whatever the source of heat, some 25 per cent. humidity. Increasing to 50 per cent humidity would just about require the same amount of coal as is saved by the reduction in temperature. Consequently increasing the humidity does not necessarily increase the coal bills.

To fully illustrate the above point assume the case of a house 20 ft. by 30 ft. by 25 ft. (cubical contents 15,000 feet) comfortably heated for say six months in the winter with an average outside temperature of 10 degrees Fahr.

Assume 65 degrees Fahr. and 50 per cent. humidity as desirable conditions. There would be about 432,000 cubic feet of air per day required if proper ventilation for six people at 3,000 cubic feet per person, per hour is desired. Multiplying 432,000 by 1.7 gives the number of grains of moisture, which expressed in pounds (divide by 7,000) is approximately 100 pounds of water per day or 10 gallons each day. To evaporate one gallon of water requires about 10,000 B. T. U's. and the burning of one pound of coal gives up about 8,000 B. T. U's. Therefore to evaporate 10 gallons of water would require 12½ pounds of coal and this amount of coal would be needed each day, in excess of the 83 1-3 pounds required for heating.

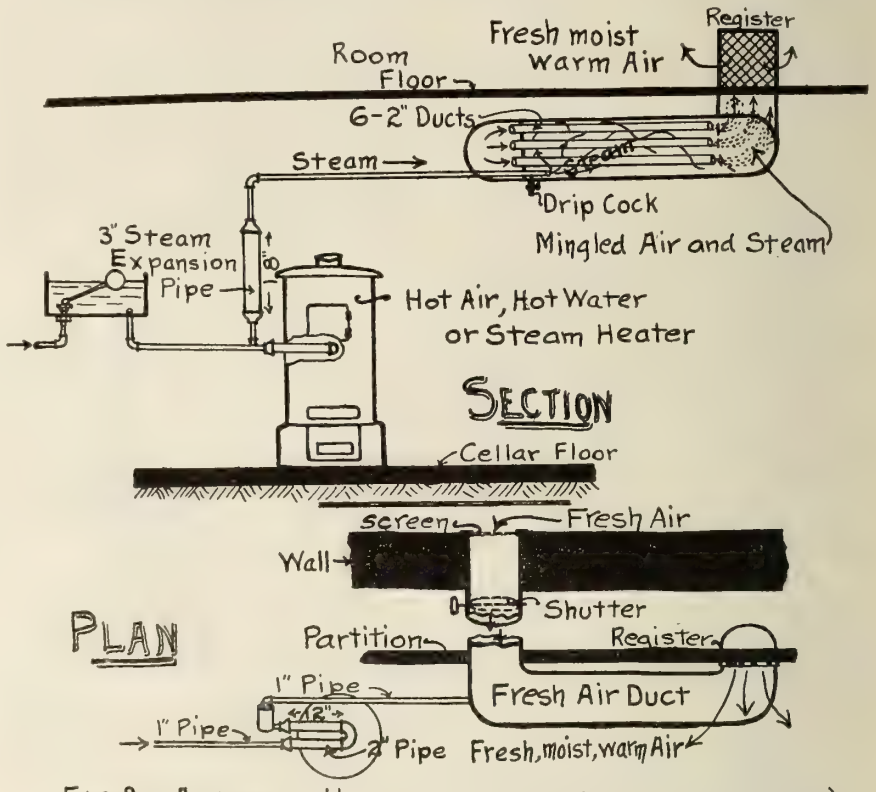


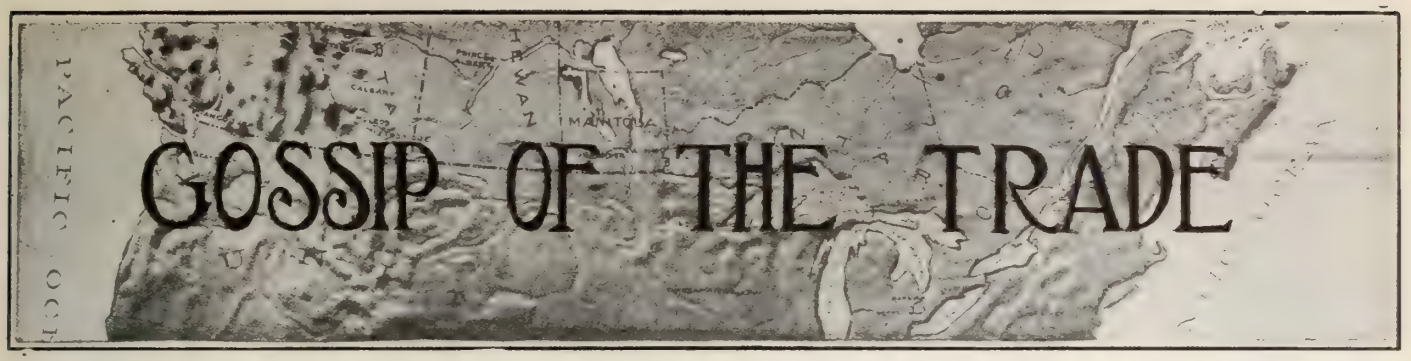
FIG. 8 — AUTOMATIC HUMIDIFYING DEVICE (ANY HEATING SYSTEM)

To heat to a temperature of 65 degrees Fahr. will by a rough heating rule require one pound of coal per season per cubic foot of contents. This means 15,000 pounds of coal per season or 83 1-3 pounds of coal per day.

Outside air with an average of 50 per cent. humidity at 10 degrees Fahr. contains only 0.4 grains of moisture per cubic foot. If heated to 65 degrees Fahr. without any other moisture being added there would result in the rooms a humidity of 0.4 grains divided by 6.8 grains (the amount of moisture in a cubic foot of saturated air at 65 degrees Fahr.) or less than 6 per cent.! But due to moisture from various sources it has been found that about 25 per cent. at 65 degrees Fahr. can be counted on. For comfort this should be increased to 50 per cent. This extra 25 per cent. of 6.8 grains means that 1.7 grains of water per cubic foot of air must be added.

If however there is no provision made for increasing the humidity the temperature for comfort would have to be raised to 75 degrees Fahr. If heating from 10 degrees to 65 degrees Fahr. requires 83 1-3 pounds of coal per day then by simple proportion it may be shown that heating to 75 degrees Fahr. will require about 15 pounds of coal per day extra.

From the above roughly approximate calculations it may be deduced that in many cases the air in the home may be kept at a healthful state of humidity and yet a saving of coal effected. And the apparatus necessary to provide such a humidity can be provided by the enterprising sanitary engineer at a reasonable cost.



NEW GALVANIZING PLANT

The McClary Mfg. Co., Ltd., London, Ontario have awarded a contract for a new galvanizing plant.

The cost is to be approximately $30,000, and the plant is, we understand, to be one of the most up-to-date in Canada.

NEW ADDITION TO PLANT

A splendid addition to the plant of the Galt Brass Co., Galt, is being made which will mean a great deal to all of their customers. A floor area of 14,000 sq. feet, new machinery, elevator and other appliances have already been acquired.

The additions comprise of two buildings, one is a two storey structure 50 x 80 feet, the other will be a one storey building 40 x 50, the approximate cost will amount to between $20,000 and $25,000.

The buildings are to be solid brick, mill construction steel sash, etc. The town of Galt appears to be justly proud of this concern which, from a small beginning is doing so well both for the plumbing trade, and for the industrial welfare of Galt.

BILL DOWNS ON THE WARPATH

Some one should ask Bill Downs of Hoyt Metal Co., what he meant by handing the hot stuff to the Editor of THE SANITARY ENGINEER, and Jack McLaren the manager of Galt Brass the other day, in the way he did. Both these individuals, we are told, have been smiling ever since.

Holiday Number Coming

Readers of THE SANITARY ENGINEER should watch for the first holiday number of the paper ever issued. It will appear in a new cover, colored to suit the season of the year, several items of particular interest will be introduced, and generally a surprise is in store for every reader.

BUSINESS GOOD IN COUNTRY

"Business is good in the country but as yet a little slow in the big cities," so reported several travellers of a number of supply houses.

Labor is scarce, and material is higher in price, so those who are buying either labor or material will have to watch overhead. These reports prove the assertions of THE SANITARY ENGINEER and justify the back to the land movement to the hilt.

High cost of living can be lowered if we sanitary engineers make living on the farms worth while by installing all the sanitary and heating appliances we can.

LESS FAILURES.

Ruinous prices are undoubtedly due to the fact that many men doing business to-day do not really know what their actual cost of doing business is.

It is not so much a desire on their part to sell at prices which do not yield a fair return on the money invested, as it is to get business, their whole idea is to be getting business, trusting that there must be a profit where a higher price is charged than is on the invoice.

No building is habitable unless equipped with every appliance known to progress that will make that building as clean as possible from foul odors, dust, dampness, well ventilated and furnished with lots of windows which will allow plenty of sunlight to enter therein.

A Black Eye, a Bruise or Two, but His Good Right Arm Not Hurt At All.

THE WEALTH OF HEALTH

With a well organized Department of Public Health a municipality may have as much good health as it is willing to pay for. If it is unwilling to adequately support such a department, the chances are that it will have to pay all the same in lives as well as in cash.

Toronto Health Reports

THE September report of the health department just to hand will be very interesting to many readers of THE SANITARY ENGINEER in that it deals with the work done by the health department in the interests of the plumbing trade to no small extent.

Under the heading of the Division of Sanitation for the third quarter, 1916, the following work has been done.

POLICE COURT PROCEEDINGS.

Nature of Case	Withdrawn	Adjourned till called	Remanded for sentence	Fined	Total	Fines	Costs
Defective plumbing	4	..	..	..	4	....	....
Defective drainage	6	1	..	..	7	....	....
Overflowing cesspools	7	..	..	..	7	....	....
Dirty premises and defective plumbing	1	..	..	..	1	....	....
Foul soil and defective drainage	..	..	..	1	1	$5.00	$2.35

DIVISION OF PLUMBING AND DRAINAGE.
Third Quarter, 1916.

Subjects		Number	Percentage of Increase or Decrease compared with 3rd Qtr., 1915.
Inspection requests		3,052	27% less
Inspections made—			
Plumbing	2,425		
Drainage	1,169		
Smoke tests	386		
Total	3,980	3,980	28% less
Letters	1,461		
Notices	1,624		
Total	3,085	3,085	10% less
Permits issued		776	24% less
Buildings represented		984	19% less
Amended plans		391	9% more

Under Police Commissioner's By-law No. 90.

Number of plumbers registered	15
Number of certificates issued	11
Number of meetings of Board meetings	16
Number of candidates examined	15

POLICE COURT CASES.

Nature of Case	Withdrawn	Adj. till called on	Fined	Total	Fines and costs
Foul privy pits	10	2	..	12	.....
Filthy premises	9	1	2	12	$14.70
Overflowing cesspools	1	..	..	1	.....
Premises unfit for habitation	..	1	..	1	.....
Foul privy and unused premises	....	2	..	2	.....
Dirty premises, foul privy pit and water supply	..	..	1	1	7.35
Foul soil and obstructed drain	1	1	..	2	.....
Defective plumbing	..	..	..	2	.....
Foul soil and drain	1	..	..	1	.....

POLICE COURT CASES.

Nature of Case.	Withdrawn	Fined	Total	Fines	Costs
No smoke test	5	..	5	.....	.....
Dismissed, work was found good	1	1	2	$5.00	$2.35
Total	6	1	7	$5.00	$2.35

Summary.

Cases in Court, July 1st, 1916	4	
Cases heard	4	
		8
Cases withdrawn	6	
Cases fined	1	
Cases in Court, September 30th, 1916	1	
		8

DIVISION OF HOUSING AND INDUSTRIAL HYGIENE.
Third Quarter, 1916.

Houses inspected	3
Houses inspected and reported on Court action	20
Houses condemned unfit for habitation	13
Houses closed (two unfit for habitation)	2
Houses vacated for sanitary reasons	18
Infectious plumbing enforced	48
Houses without water supplied	20

Improvements effected

Sinks installed 84

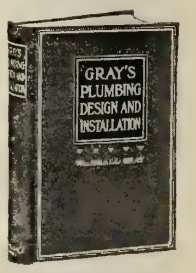
It will be seen that the plumbing division have not been idle by any means and that conditions are improving all along the line as a result of the work of the plumbing inspectors and that department as a whole.

It might be stated, however, that quite a number of items have been omitted from this official report, because of the fact that the omitted items are not of any particular interest to sanitary and heating engineers.

The number of inspections made deserves some note. Particularly for a city the size of Toronto, because such a large number must involve a great deal of time travelling from place to place.

NEW BOOK FOR SANITARY

Another splendid book has been published in the interest of the plumbing and sanitary engineering profession, entitled "Gray's Plumbing Design and Installation." It is a library in itself, dealing with problems which, to the writer's knowledge, have never before been dealt with in print.



The plumbing trade has been served very sparingly with up-to-the-minute technical has appeared in trade matter, except such as papers, and this book should prove a boon to the trade. It is a splendid book in every detail, and should be on every sanitary engineer's book-shelf.

Full particulars may be procured from the Book Department, MacLean Publishing Co., 143-151 University Avenue, Toronto.

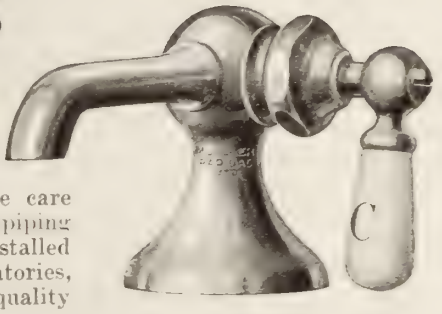
A DAILY THOUGHT

Build for yourself a strong box,
Fashion each part with care;
When strong as your hand can make it,
Put all your troubles there,
Hide there all thoughts of your failures
And each bitter cup that you quaff;
Lock all your heartaches within it,
Then sit on the lid and laugh.

Tell no one else its contents,
Never its secrets share;
When you've dropped in your care and your worry
Keep them forever there;
Hide them from sight so completely
That the would will never dream half;
Fasten the strong box securely—
Then sit on the lid and laugh.

IN A CLASS BY ITSELF

MUELLER
Rapidac



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You can make the whole installation poor by attaching poor brass goods.

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Question Box

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

Editor The Sanitary Engineer.

Last fall I installed two furnaces in an apartment house, and in the early part of the winter they worked well, in fact not until towards the spring did I have any complaints. I found that the owner had fired the janitor and got a woman to clean the rooms. He himself looking after the furnaces.

Upon looking over these furnaces I found them in a very dirty condition and that they had been left all the summer in that state. My contention is that the efficiency of the furnaces has depreciated on account of neglect. Soot and rust scale is thick. I will admit that these furnaces ought to have been bigger, but I put in what the architect called for, so that part is not up to me. I have advised my customer to have the furnaces covered as well as the pipes and he does not think that these suggestions are any good.

Would you kindly give a little information in your next issue about soot and scale, also something about good and bad conductors of heat and cold.

—A.S.F. A new Reader.

Regarding the troubles of A.S.F. the worst feature of all is that too small furnaces were installed, next that they were not covered at the time they were installed. The pipes also should be covered. Many cases have been proved where as high as 10 per cent. in coal has been saved by the covering of the furnaces and pipes.

The following items about heat conductors etc., and the effect which soot and scale has upon a furnace bear upon the matter in question.

Things to Remember About Scale

It is estimated that one-tenth inch of scale is equivalent to 10 inches of metal, and is thus a poor conductor of heat. A boiler with a scale on its heating plates or pipes will require a lot of fuel to generate steam or heat units.

Soot

One-hundredth part of an inch of soot is equal to 10 inches of metal, which means that it will take one hundred times more fuel to penetrate a thickness of soot as against steel or iron or other metals.

In other words, it is just as easy for heat to pass through ten inches of iron as it is to pass through one-tenth inch of scale or one-hundredth inch of soot.

Good Heat Conductors

All metals are by far the best conductors of heat, some more than others. Silver, however, heads the list. A good conductor of heat always feels colder to the touch than a poor conductor.

For instance, if one steps with his bare feet from a carpet on to a wood floor, the wood feels colder. Still colder will linoleum feel to the touch, iron would feel colder still yet all four are the same temperature. How is this phenomenon explained? Simply because the iron, linoleum or wood, will take or absorb, the heat from the body to a greater extent than will carpet, or say our clothes. If the clothes we wear were a good conductor of heat, they would be in the same class as a suit of mail in the old fighting days.

Just imagine for one moment a person wearing a suit of mail, with the temperature 25 degrees below zero.

Poor Heat Conductors

Liquids are extremely poor conductors of heat. Take as an example a cake of ice, play the flame of a gasoline torch on it and watch the steam rise off, even though the fraction of an inch below the temperature may be any number of degrees below freezing point.

Air and gases too, are even poorer conductors of heat, that is why we are able to wear clothes as a protection from the cold. If we were to take and make a suit of clothes from felt, it is not really the felt that prevents the cold from penetrating to our body, but rather the air spaces in that felt. The air space in a refrigerator, a thermos bottle, etc., are good illustrations.

—Editor.

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Drinking Fountains
WILL PROVE A PROFITABLE LINE TO HANDLE

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The "Safety First" movement, which is becoming more popular every day, is particularly forcible where the conservation of the Public Health through pure drinking water is concerned. The old-fashioned, disease-laden public drinking cup will soon be but a memory in thousands of plants, offices, shops, public parks, schools, etc.

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The Puro Sanitary Drinking Fountain will recommend itself because of its simplicity of attachment, and its automatic control.

Write to-day and let us show you how to make a handsome profit, not only on the sale, but also on the installation of the "Puro."

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3 Sizes Capacities ⅛ to 8 inch pipe
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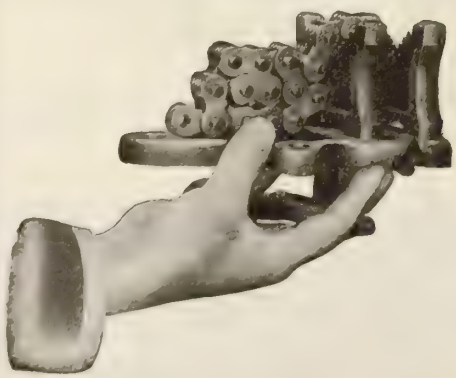

Before you return you may need to turn a thread, make a bend, cut off an end or perform any of the other ordinary operations for which a steamfitter is usually summoned.

Better go prepared and clinch a life-long customer on your first visit.

They won the "Grand Prize" of the P.P.I.E.

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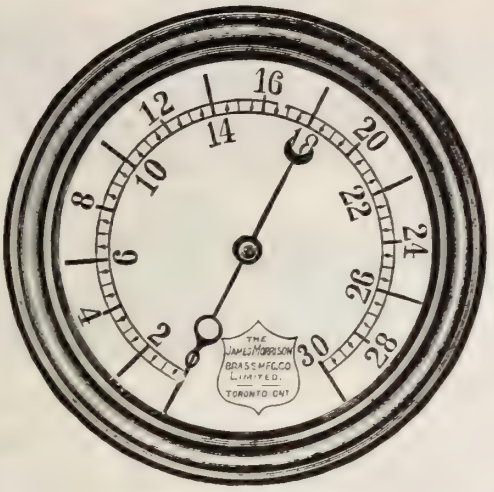

Manufacturers of Steam, Vacuum and Combination Gauges; Locomotive and Duplex Gauges; Morrison's Standard Test Gauges; Hydraulic, Altitude, and Sprinkler Alarm Gauges; Combination Water Works Gauges; Pyrometer Gauges; Engineers' Clocks and Revolution Counters; Pressure Gauge Testers; Pyrometers for Bakers Ovens; Recording Pressure and Temperature Gauges; Blast Pressure Gauges.

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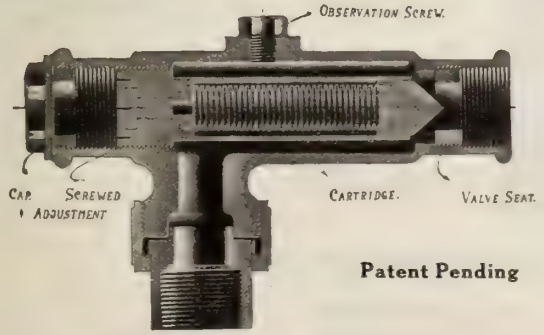

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Try it out.

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THE finding, holding and multiplying of customers is your great business—probably your great problem. There's no royal road—no priceless route—to them. The plain way to find, interest and persuade them is the well-traveled way, the way of Public Advertising.

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If you are seeking a single medium of potency, of prestige, of sufficient circulation, you will find it in

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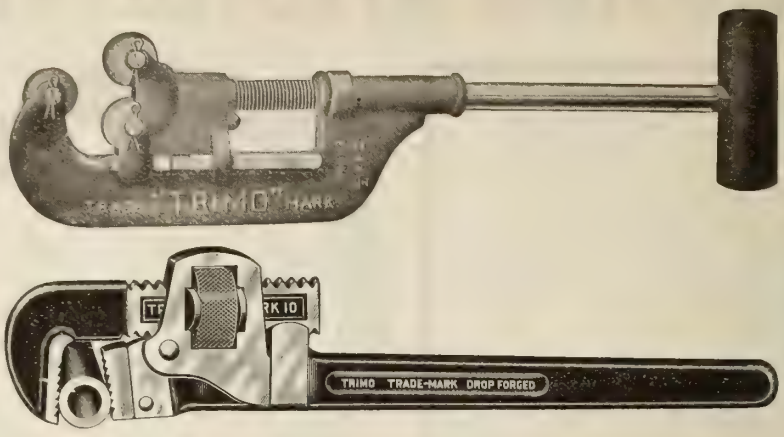

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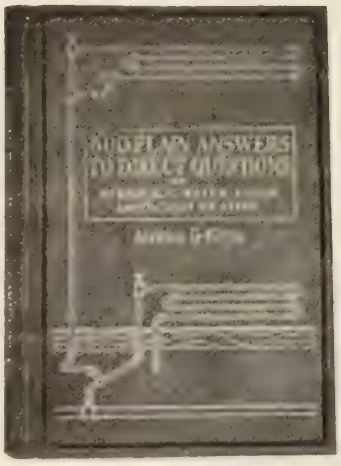

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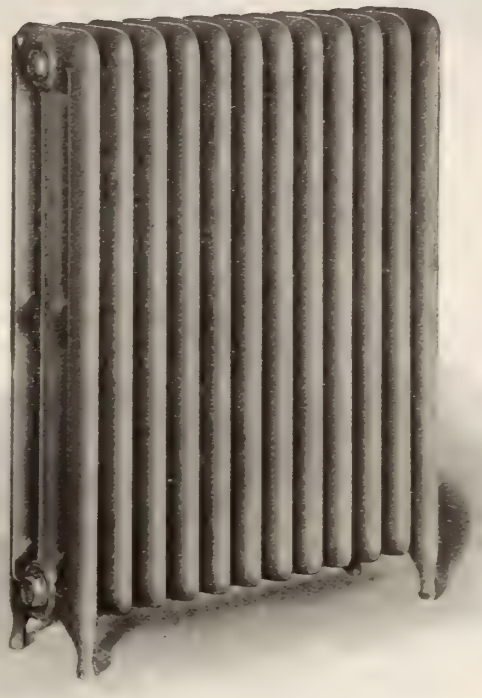

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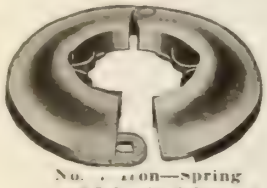

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BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

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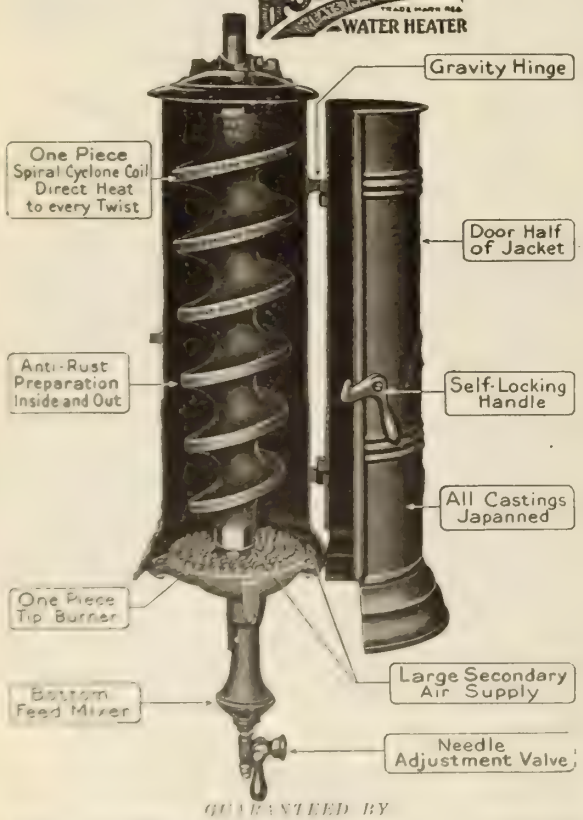
The Hotstream WATER HEATER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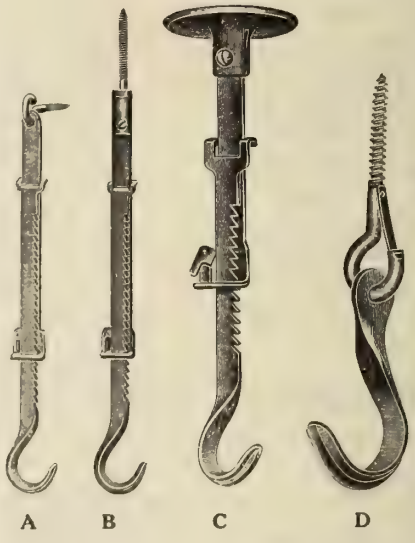

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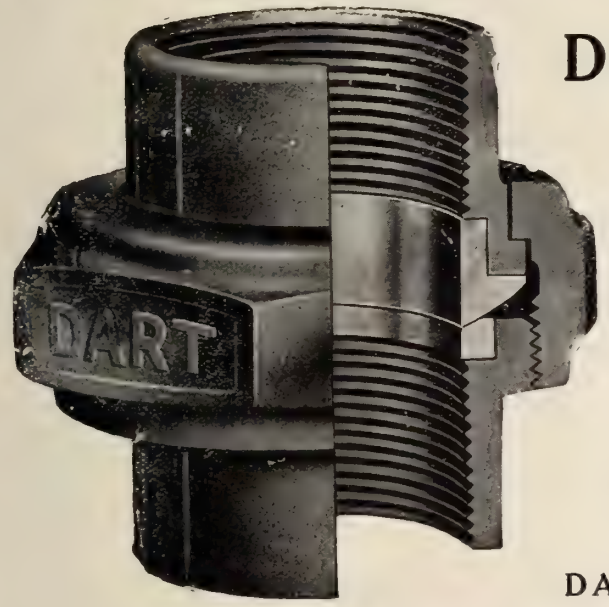

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are permanently satisfactory pipe couplings.

They never loosen up and leak, because both faces of the joint are of BRONZE (a non-deteriorating metal) and the HEAVY IRON PARTS cannot stretch or pull apart.

Dart Unions save time

The faces of the joint being ball-shaped, connection is easily and quickly made, whether pipes are in or out of alignment.

DART UNIONS ARE BACKED BY A LONG, SUCCESSFUL RECORD, AND ARE FULLY GUARANTEED.

Sold by all supply houses.

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DART UNION CO., LIMITED, TORONTO

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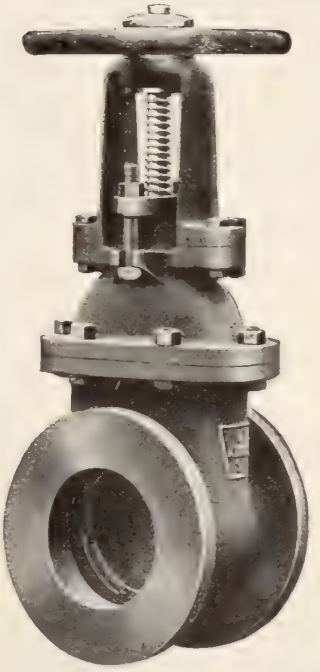
KERR IRON BODY GATE VALVES



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Our Catalogue No. 5 tells all about them. It is yours for the asking. Write us to-day.

Approved by the Fire Underwriters Association, and Registered by Boiler Inspection Departments of Ontario, Saskatchewan and Alberta.

THE KERR ENGINE COMPANY, LIMITED - Walkerville, Ontario

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"PERFECTO"

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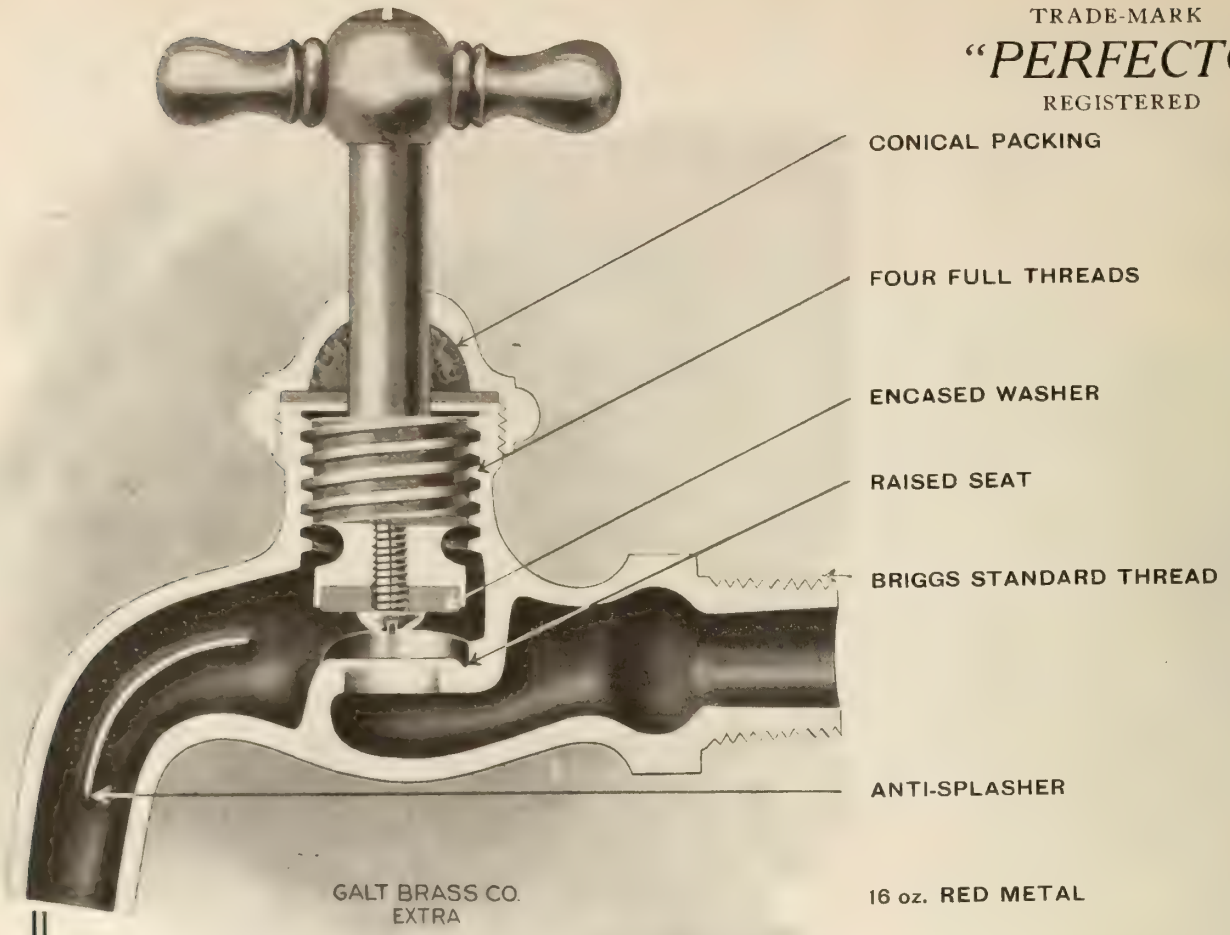

The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. X | Publication Office: TORONTO, DECEMBER 15, | No. 24

A Christmas Message

IN friendly appreciation of another year of pleasant business relations, we wish to send

The Season's Greetings

to all our customers.

Though our Empire is still at war, our people are united in the assurance of the rightness of our cause and a complete and glorious victory for our arms.

This thought must brighten the holiday season.

Empire Manufacturing Co., Ltd.

London Toronto

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is a Lavatory Fixture Worth While

A HIGH-GRADE LAVATORY THAT CANNOT BE SURPASSED

A bathroom which is fitted with Beaver Brand cast iron enamel ware bears the stamp of quality and lasting service, and a pedestal lavatory puts such a bathroom in a class by itself.

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Made in Canada

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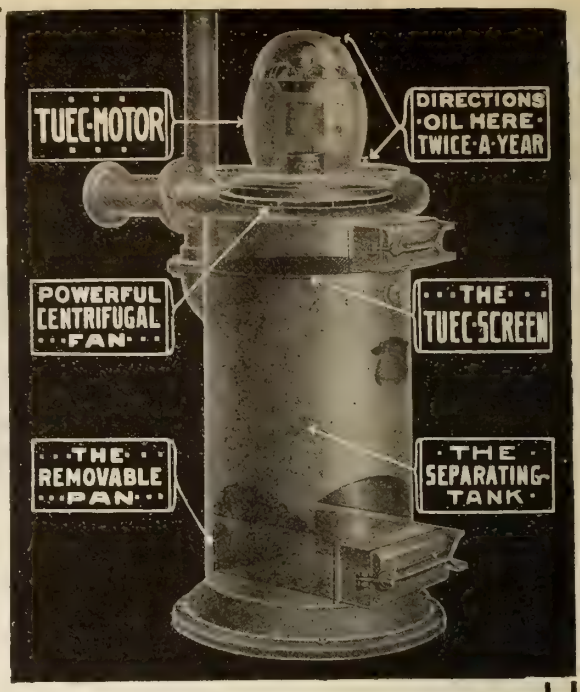
That there is no line more profitable to all concerned than the selling and installing of TUEC Stationary Vacuum Cleaners.

TUEC users declare they cannot speak too highly of the service rendered by this Wonderful Machine.

It will clean floors, carpets, tapestry, beds, walls, ceilings, from attic to basement.

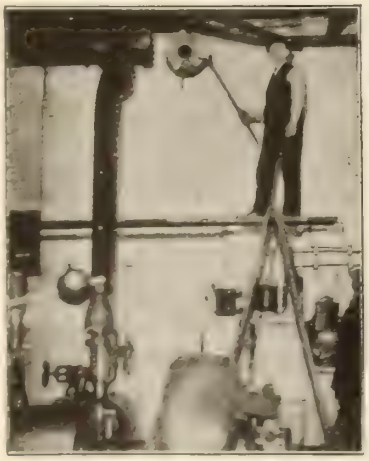
Over $500,000 behind every machine.



THE UNITED ELECTRIC COMPANY

159-161 Richmond St. W., Toronto, Ontario

A "TOLEDO" at work in an awkward position.



A 6-inch pipe projecting only 10 inches through a brick wall, and 12 feet above the floor required to be threaded. It would have been a costly job to have taken it down to have the thread cut, but a "Toledo" No. 3 quickly did the job.

It took two men, only, to get the tool up on the pipe.

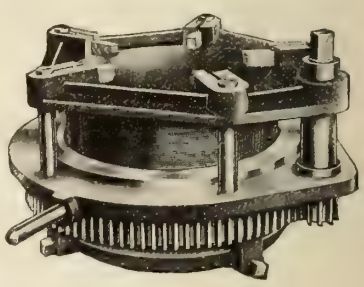
After it was up, one man easily cut the thread.

"Toledo" and "Jardine" Ratchet tools, work in any old corner.

They finish a thread at one cut, making as clean a job as if cut in a lathe.

They are made in Canada. One man does the work of two.

Write for catalog and full particulars.



A. B. JARDINE & CO.

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Sole makers of "Jardine" Pipe Threading Tools.

Sole licensees in manufacture and sale Toledo Pipe-Thread [illegible] Tools in Canada.

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"Toledo" Geared Adjustable Threading Tool No. 3

Capacity 4½" to 8" inclusive, complete with Ratchet and Driving Cross.

This tool does the work that formerly required a heavy power machine.

One man can easily thread an 8" pipe.

DART

Time and Fitting Savers

These styles of Dart Unions eliminate the use of several fittings, save the time of making several connections and enable you to do neater work.

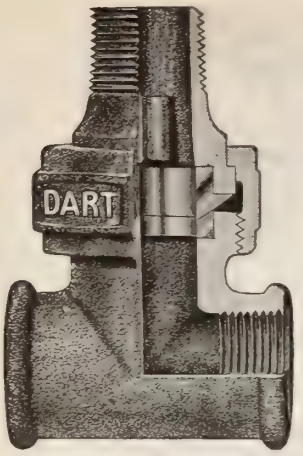
Dart Unions Stay tight because the BRONZE TO BRONZE faces never rust or corrode, and the **HEAVY IRON PARTS** will not stretch or pull apart.

Sold by all jobbers.

Manufactured and Guaranteed by

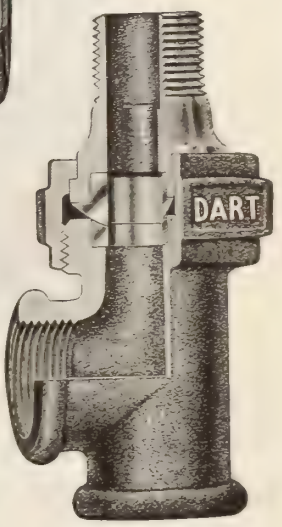
—Dart Union Company Limited—

Toronto, Canada



Combined T, Union and Nipple

Combination of T, Union and 2 Nipples



KERR GATE VALVES

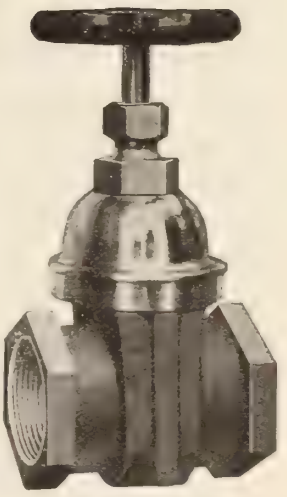
I. B. GATE

These Iron Body Gate Valves were designed and are made by US to meet YOUR demand for strong, substantial, interchangeable valves, with "nobby" appearance.

They meet the requirement and more. When they get us a customer they hold him.

Who in the Steamfitting trade has not heard of and used Kerr's (Weber) Brass Gate Valves? We say "Kerr's"—not the imitations. We make this valve of uniform material, and they stand up to the work given them, just as they always have. Some have tried others, but they came back to the tried and trusty old "Weber Gate" made by Kerr. What is a few cents on a valve, when you can get one like the genuine "Weber"?

Have you our Catalogue No. 5 ?
If not, we will mail you one.
A postal to-day will bring it.



BRASS GATE

THE KERR ENGINE COMPANY, LIMITED

WALKERVILLE, ONTARIO

From the time when put in service and for years after they are installed

JENKINS BROS'. VALVES

are a source of satisfaction to the user. With a little attention now and then, they will give permanent service and satisfaction.

They do not give out or require replacement, due to the fact that most of the wear is taken by the dependable but inexpensive JENKINS' DISC, and also because in the manufacture of the valves the most careful attention is given to every detail in design, metal and workmanship.

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Jenkins Bros. Limited

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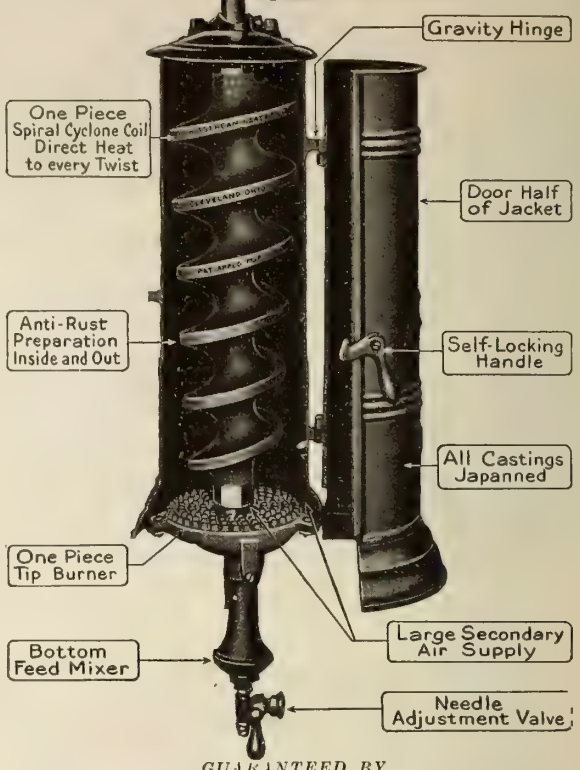
The Hotstream WATER HEATER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One Piece Spiral Cyclone Coil Direct Heat to every Twist
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Self-Locking Handle
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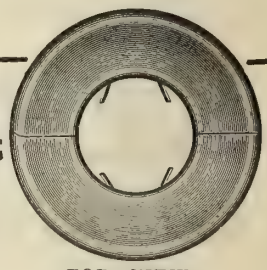

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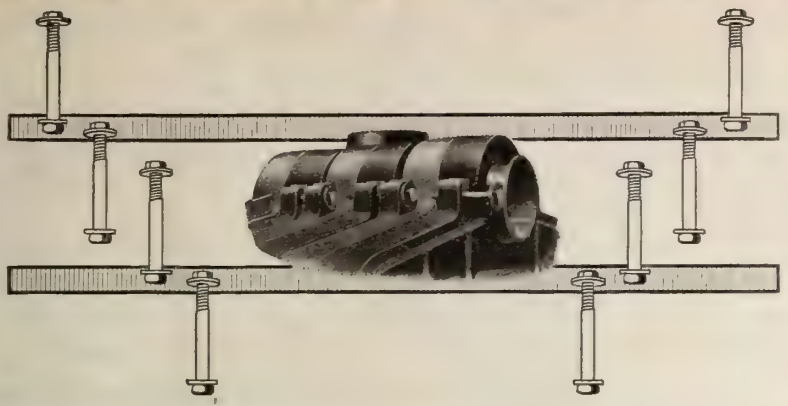

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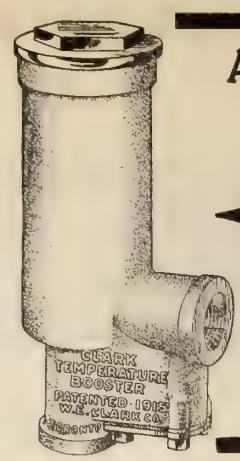

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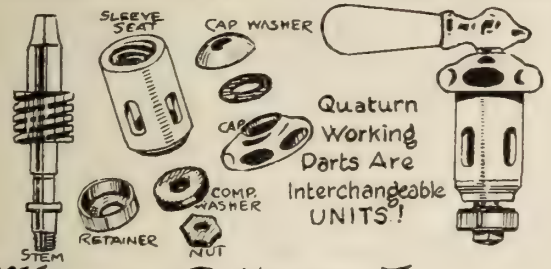

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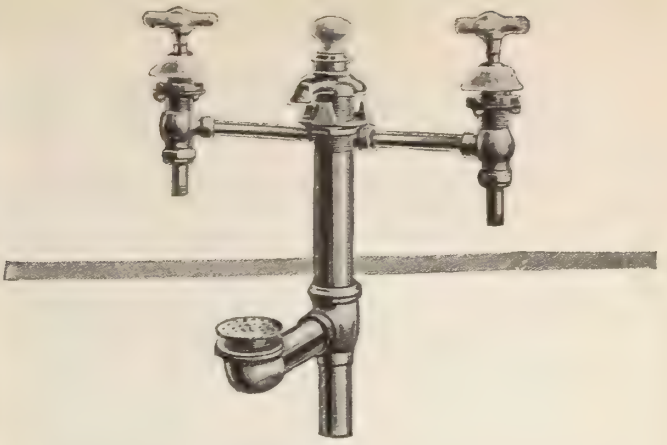

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SPEAKMAN

SANITARY ENGINEER

PLUMBER AND STEAMFITTER OF CANADA

Official Organ of the Sanitary and Heating Trade

Vol. X. TORONTO, DECEMBER 15, 1916 No. 24

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EDITORIALS

Merry Christmas—Clean Business Methods—Provincial Plumbing By-Law—Good Buying a Practical Opportunity

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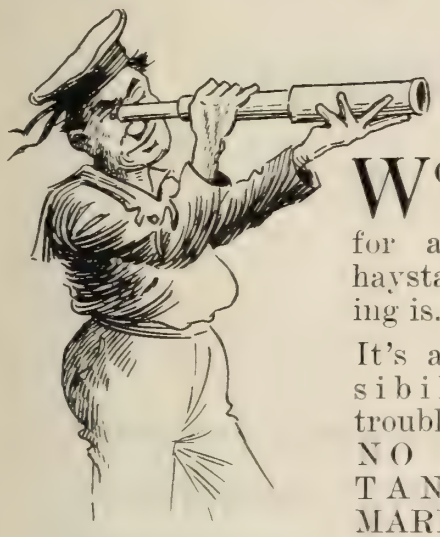

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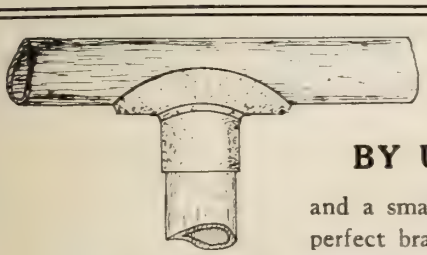
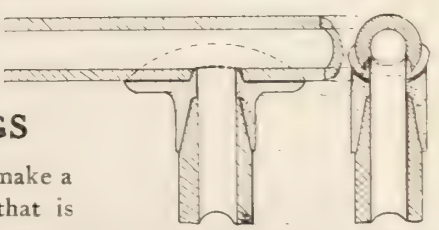


View Of Branch

The Scientific Metal Jointer



Sectional View & Plan

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THE SANITARY ENGINEER

VOL. X DECEMBER 15, 1916 No. 24

The Cost of Doing Business

Cost is Something Absolute, it Must be Paid in Some Form or Other and by Some One —The Person Starting in Business Should Never Lose Sight of the Cost of Doing Business, if He Wishes to Succeed.

BY ONE OF US.

Article No. 2.

IF our readers will just turn to page 11 of the last issue, they will see how we were discussing the affairs of the one man and a back-shop business.

We find that it will cost at least $6.04 per day, 300 working days. But I hear someone say, "Oh, yes! Show me the fellow starting for himself who takes 65 days a year clean out of his working days. Sixty-five days is every Sunday and a couple of weeks besides. The man is yet unborn."

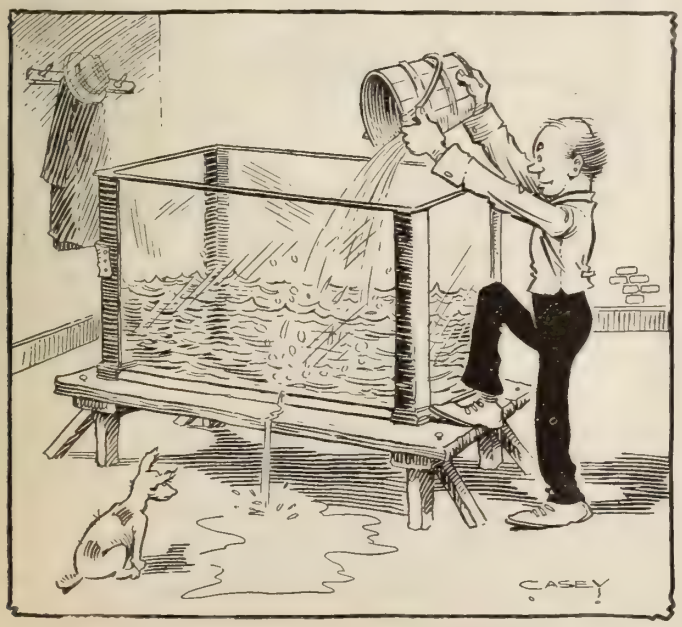
"Why, Sunday is the very day when I make up my books," says one fellow, "and I'm not by myself. I'll tell you how I know. Phone bell rings, and Bill Jones wants to know what I'm charging for a 3-in. roll rim, 5-foot cast iron bath, and how much a foot am I getting for 2-in. galvanized pipe? Can't you see between the lines? He's making some bills out, or else busy charging up some goods. I know all about it, Mr. Editor; I was at the same job when the phone bell rang."

The above quotation was part of a conversation which took place just about an hour before the writer started in on this article.

Now, here is another item we have got to charge up, and to be on the safe side every day in the year, at least for the first year, should be charged up, so it is going to be charged here in this article. 365 days, 11 hours a day, at 50 cents per hour, amounts to $2,007.50. That's a big sum of money, but figures do not lie, in this case at any rate. We are discussing cost, and we must not be afraid of looking at matters just as they are. The next thing to arrive at is this: What number of hours can we charge on the bills we send out? That's part of our method of finding out what the overhead expenditure is.

Seeing that an allowance of 2 hours per day for 300 working days has been made, a further addition is also made by suggesting that every day is a working day for the new starter, and we are not overstepping the mark; at the same time we must not forget that a lot of time will be lost each day on estimating, consulting prospective customers, etc.; therefore we will presume that counting Sundays and every moment spent over and above 9 hours per day for 300 working days, must be charged as overhead expenses, that 9 hours per day for 300 days shall be charged and be collected at 80 cents per hour. That would net $2,160. The time spent in the business which could not be charged to anyone directly, must therefore be an overhead expense, as follows: 65 days at 11 hours per day, 715 hours, and 2 hours per day for 300 days, will come to 600 hours. Add these figures together and we find that no less than 1,315 hours have been spent over and above the time we can charge on our invoices, viz., 2,700 hours at 80 cents.

But this 1,315 hours should not be charged at merely 50 cents an hour, if we were to consider what a boss would have to pay. Almost every employer would pay time and a quarter at least. Sundays, double time, and statute holidays, time and a half. But we will be



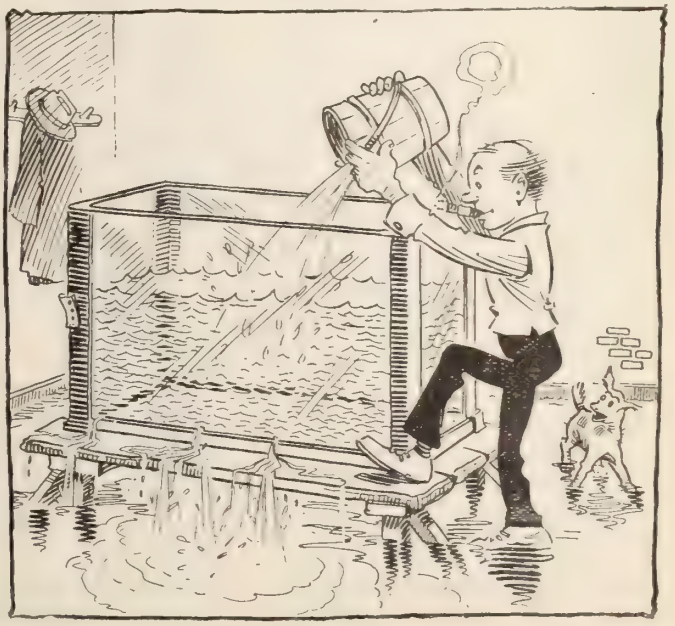


Fig. 1 shows "just a little leak" which could have been easily fixed. Fig. 2 shows the development of more leaks.

a little more lenient in this case and simply charge straight 50 cents per hour for the 1,315 hours; the amount would be $657.50, and do not forget that still more than this sum would be paid by any employer for work urgently required to be done, and apparently this overtime is necessary.

Now, let us see how the figures stand, by reckoning up the debit and credit side.

Transactions	Debit	Credit
To 2,700 hours at 80		$2,160.00
By 1,315 hours at 50	$657.50	
" telephone for one year	50.00	
" stationery for one year	13.00	
" tool upkeep for one year	13.00	
" interest on $500 for one year at 5%	25.00	
" shop rent $5 per month	60.00	
" salary 2,700 hours at 50c per hour	1,350.00	
Totals	$2,168.50	$2,160.00

Just give those figures a little thought and see how they compare with working for an employer at 50c per hour. The business on time alone has netted $2,160, but he has spent $2,168.50. Some one may say that the sum of $657.50 should not be charged up to a new business; but let me tell you, readers, Father Time and Mother Nature will charge it up with compound interest.

Don't for one moment think that any man can work 365 days per year, 11 hours per day and get away with it. Furthermore, this time, we presume was necessary; then why not charge it? That is just where mysterious cost endeavors to creep in. It must, therefore, be admitted that, counting straight time only, there is a dead loss of $8.50, besides being a slave to one's business for 365 days a year. And the more time put in the greater the loss unless more than 9 hours per day can be charged to some job and cash received for same.

Let us conclude this article by telling the story in connection with the accompanying sketches.

This man, we will say, starts in business; he is filling, or proposes to fill the tank with water. There is a small leak, nothing amounting to anything, and no notice is taken of it. The dog has his eye on it, just like the sanitary engineer who loses a little on the first job, but intends making it up on the next. What a mistake! But pail after pail of water goes into the tank, the water rises, and the more jobs the more small leaks, small

losses, until finally some creditor asks for his money, and Mr. Sanitary Engineer begins to check up, feels cold about the knees. The leaks have risen to such a level as to be uncomfortable, and even the dog realizes that a new move must be made. So does Mr. Sanitary Engineer. As the winter evening is long and the money is short, we find Mr. Sanitary Engineer in a different mood. He is counting cost. He is looking back to the time when the harder he worked the deeper he got into the water.

What conclusion can we come to so far? Simply that no business should be allowed to grow by increasing one's liabilities, but rather on the profits made in that business. Further, do not become a slave to your business, or it very soon governs your actions by making you work harder and longer than nature ever intended you to do. Do not think, however, for one moment that in saying this, working hard or extra hours is being discouraged. On no account would we do this. But do see to it that the business pays for the extra hours devoted to it, just as an employer would pay for every hour worked for him.

Continued in next issue.

A SERIES of experiments recently carried out by the British Fire Prevention Committee shows that the best way to extinguish a small gasoline fire is to spread over the burning liquid a mixture of 10 pounds of bicarbonate of soda and 12 pounds of common sawdust. The sawdust need not be wet, but must be free from chips and shavings. The theory is that the sawdust, by floating on the burning liquid, excludes the oxygen of the air, and the heat of the flame generates carbonic acid gas, which helps extinguish the fire. Sawdust alone gives satisfactory results, indeed better than sand or similar materials.

Fig. 3. Up to the knees in leaks, in fact they are making it impossible to proceed. Fig. 4. "Gee, whiz. How easy it would have been to stop the first leak at the start."

A Plea for Strict Plumbing Codes

Control of Plumbers by Water Works Departments Suggested — No Doubt More Uniformity Should be the Rule.

By Dr. Wm. Paul Gerhard, C.E., New York City, author of "The Water, Sewerage and Plumbing of Modern City Buildings," and other standard books on sanitary subjects.

Some Details Regarding the Water Supply of Buildings

The water department, knowing intimately by its own investigations and by chemical and biological analyses the character of the water supplied to consumers, is in the best possible position to give advice regarding the material suitable for supply pipes. Galvanized wrought iron pipes are found to corrode in some places in a few years, especially if the water is soft and contains much dissolved oxygen. Some waters attack lead pipes, others do not.

A good code provides that no water pipes be buried in plastered walls, or be run in inaccessible positions, where they cannot be reached in case repairs become necessary. It also provides that there should be a shut-off valve at every fixture, including the flushing tanks of water closets, slop sinks, and urinals.

In some English towns, like Manchester and Liverpool, all water fittings are tested and stamped by the water departments, and only stamped fittings are permitted to be used. In our own country such a far-reaching control or discrimination is neither practicable or desirable, but owners of buildings should be cautioned, in their own interest, to specify or purchase only fixtures and fittings made by manufacturers of first-class reputation. The difference between such fittings and cheaper ware is usually but slight, whereas the cost of removing and renewing fittings, which turn out to be defective and unsatisfactory, is considerable.

The style of water tap or faucet to be selected depends to some extent on the existing water pressure. Where this is heavy, ground key and "Fuller" cocks should be avoided, and faucets of the compression or screw-down type should be avoided, as they quickly disintegrate. Washers of an asbestos packing composition are far preferable.

All water closets and other flushing tanks, as well as the flushometer valves, should be subject to approval of the water department. Both fittings are very apt to cause waste of water, which often remains unnoticed, especially so in the modern siphon-jet closets, where the flushing water enters largely below the water line. By holding the ear to the flush pipe one can often detect an otherwise imperceptible leak.

Tank ball cocks in particular require careful inspection. The whizzing noise in many ball cocks can and should be prevented. Flushing devices for water closets, no matter of what style or type, should be so arranged that there is no direct connection between the water closet bowl and the water supply pipe.

All overflow pipes should have their discharge pipe ending where a flow, if it should occur, would be conspicuous. This applies in particular to the overflow pipes of house tanks. The pipes from these should never connect with a soil or drain pipe.

Where house tanks are used, either in the attic or on the roof, to store the water, the distribution of their weight and their position should be properly considered. The tanks should be of proper material and be covered to exclude floating dust, gases, odors, vermin, mice, and so on. It would be a good place to enforce a rule that all house tanks must be cleaned twice a year.

Space forbids taking up the question of hot water supply, the location, size, material of kitchen boilers, cellar hot water heaters, etc.

Conclusion

The examination, licensing and control of plumbers, who wish to do any work—contract or jobbing, new work, alteration work or repairs—in connection with the waterworks system of a city or town, are matters of vital importance to a water department. To exercise such control without, in some cases, friction being created, is not always easy, but much can be accomplished in this direction, and trouble and misunderstandings avoided by a firm and tactful conduct of the men who compose the board. If they are chosen for their fitness for the position they will surely enjoy the confidence of their fellow-citizens.

It is decidedly to the interest of all waterworks plants that permission should be obtained to do work in buildings. The systematic filing of plans, of the specifications, of the record plans, showing the location of the fittings, and of diagrams, giving the number, style or type, size and material of fittings, acts as a decided measure or protection to property-owners. It should, therefore, be universally encouraged.

Some waterworks plants, even those where the water is purified by filtration on a large scale, fail to give entire satisfaction, because of troubles existing and persisting from the point where the water leaves the main until it reaches the consumer. Under such conditions arise numerous troubles and complaints of the water-takers.

It is the business and the duty of a progressive, broad-minded and public-spirited water board to thoroughly investigate each complaint, no matter how trivial it may appear to be. Occasionally the consumer finds it necessary to complain of dirty water, and this may be caused by accumulation of deposits and rust in old worn-out mains, which cause the benefits due to the filtration plant to be lost, though there may be other causes. The most usual complaint is that there is "no water," or that the flow in the house service is perceptibly obstructed. The cause may be an obstruction in the street tap, where small fish and eels are apt to get lodged; in winter time the service pipes occasionally freeze, and give the water department considerable trouble and work in the thawing out of the pipes. When a thaw occurs after frosty weather, leaks in the service or house pipes may occur. Occasionally the ball cocks of the house tanks become disarranged, and the tanks do not fill up. In other cases the water fails to flow, where pressure filters had been installed inside of buildings on the main service, because the filters became partly choked up by reason of the imperfect washing of the filter beds.

The Waterworks Board controls some of these points, and in others it can do much to retain, or to regain, the confidence of the water consumer by practical advice and by efficient and prompt action in remedying the troubles complained of.

A LITTLE CARE

Careful inspection and prompt repair of defective flues, and asbestos or metal protection for all woodwork near stoves and pipes would materially reduce the number of fires in Canadian homes.

MOISTURE IS VALUABLE

Adding moisture to the air reduces the amount of heat necessary for comfort. As much as 20 per cent. of the coal bill can be saved by adding moisture to the air. Air should never contain less than 40 per cent. and preferably 50 per cent. of humidity.

Moses Irons Uses Sense in Buying

Fiction, But Packed With Practical Hints on How to Speed Up the Rate of Turnover —He Discovers That Getting Men to Work Together is a Good Deal Like Training Colts to Team.

By Daniel Louis Hanson. Illustrated by C. D. Mitchell.

III.

Two years passed. Mr. Pearsons was again a visitor in Moses Irons's private office. He had just finished reading his Memphis mail and was carefully putting it into his pockets. He kept one letter, however, in his hand.

When Moses Irons had finished his telephoning and swung around with a hearty: "Well, Albert, how did you leave things in Memphis?" Mr. Pearsons struck immediately into the subject that lay uppermost on his mind.

"Do you remember, Moses," he asked, "my being present a couple of years ago when you were overhauling your buying department? I have often wondered how your new system worked out and what it really is. I want to install something in my business that will help keep the surplus stock down and at the same time keep us up to date on the new fixtures coming into the market."

"It is quite a story, but I can give you the essential features in a few minutes," the ironmaster replied. "Of course, we experimented for a while after that Saybrook individual shook the dust of this office off his feet. We tried leaving all our buying to the various subsidiary sales departments. That is a splendid scheme for a general store on State street, very likely, but it was not practical, as a whole, for us.

"Out of it, however, we did save something. We let one or two departments do their own buying. That is, they make requisitions which are accepted without question by the purchasing department. The purchasing department simply signs them and arranges for prices, terms, and deliveries. Our cast iron department is operated that way to-day. It is understood at all times, of course, that the head of that department and the buyer [illegible]

[illegible]

[illegible]

[

Mr. Renwick and I have some things to take up together.''

''Has any one else something to offer for the good of the buying department—questions or suggestions?'' Moses Irons looked slowly around the flat-topped desk.

''Here is something I picked up in the train this morning. It may be an old story to Mr. Raymond, though,'' the factory manager said, and handed a circular about a patent floor connection across the table.

''Thanks. I never heard of it before,'' answered Mr. Raymond, as he put it among his papers.

''Oh, by the way,'' — Renwick was talking this time—''I noticed from the train last evening that those new building out beyond Oak Park on the Galena Division are part of a malleable iron foundry. They have just put up a sign —'The Consolidated Malleable Casting Company.' Possibly Mr. Raymond can make good connections with them on rod couplings. We never have been able to get fixed just right on rod couplings and this may happen to be our chance.''

The name of the new concern went down in the buyer's memorandum book.

''Next Tuesday morning at ten, then,'' said Moses Irons, as the ''Buying Cabinet'' meeting closed.

V.

''It is a great scheme, all right,'' declared Albert Pearsons as he and Mr. Irons walked down the boulevard to luncheon. ''It helps the buyer.''

''Yes, and it helps all the rest of us, Albert. It broadens us and it makes us money,'' the ironmaster replied.

They waited for a clear crossing at the Board of Trade. After they had crossed, Moses Irons continued: ''As a boy I used to break colts up in Massachusetts. I learned there are two distinct stages to that work. First, getting the colt to pull single. That is quite a job and it seems a hopeless one until some bright morning, all of a sudden, the beast discovers he can pull a load. His pride is then awakened in a moment, apparently. There is no limit to his ambition. He can do, and he will do.

''Then comes the second stage. It is teaching him to team. That is the hardest work of all. He knows he can pull, does that colt, and it is there that the trouble starts—he won't consent to let a helper get into the harness with him. So I guess, Albert, that the 'efficiency-izing' of a group of executives is much the same as training colts. The natures of men and colts are about the same, after all—both need to be taught horse sense.''

''What did you do with that three-hundred-thousand-dollar stock?'' asked the Dixie Yankee.

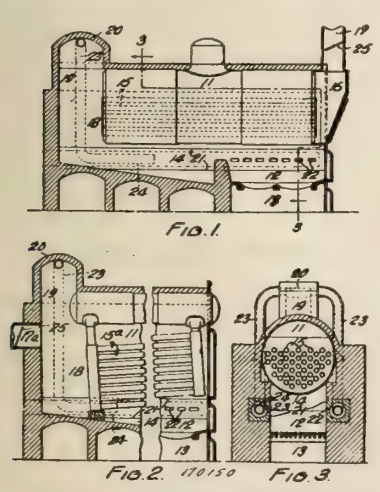
''Sold it to some silly jobbers, Albert,'' replied Moses Irons, as he deftly steered his friend out of the crowd and into the entrance of his club. ''I couldn't afford to have my name as an up-to-date manufacturer dwindle in the estimation of the master plumbers. I sold it at fifty cents on the dollar to some concerns which apparently mistake peddling for merchandizing.''

New Canadian Patents

No. 170,150

William P. Brown, London, Ontario, Canada, 13th June, 1916; 6 years. Filed 8th April, 1915. Receipt No. 250,333.

Claim.—In combination in a furnace having a grate, a smoke outlet, a firebox, a gas collecting and separating chamber



No. 170,150. Furnace.

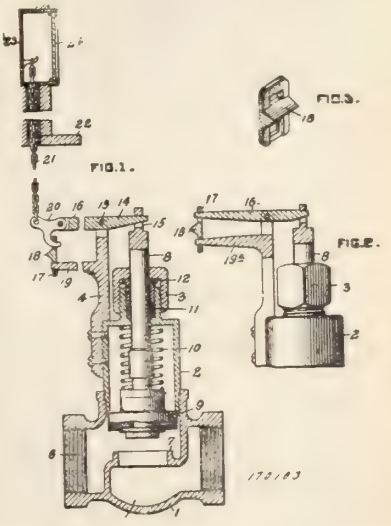
located within the furnace at a point higher than the smoke outlet and out of and above the direct line of draft from the firebox to the smoke opening, said chamber being so positioned above said outlet that the lighter gases of combustion will rise therein and stagnate, whereupon the gases of different densities will separate naturally, and means for conducting the lightest gas back to the firebox, comprising an air inlet flue on the side of the firebox above the grate provided with openings communicating with the firebox, and a return flue from said chamber terminating in said air inlet flue and encircled thereby.

No. 170,103.

The Equitable Meter Company, assignee of Edwin Cornelius Weisgerber, both of Pittsburg, Pennsylvania, 13th June, 1916; 6 years. Filed 1st February, 1916. Receipt No. 260,743.

Claim.—1. In a thermal cut-off valve, the combination of a casing, a packed longitudinally movable valve stem, a stiff spring for pressing said stem toward valve closing position, a lever pivoted to said casing adjacent to the outer end of said stem and having long and short arms extending transversely to said stem, the short arm of said lever engaging the outer end of said stem and holding it in open valve position against the pressure of said spring, and a fusible link connecting the long arm of the lever to said casing.

2. In a thermal cut-off valve, the combination of a casing, a packed longitudinally movable valve stem, a spring within said casing and exerting its pressure upon said stem to press it toward valve closing position, a lever support secured to said casing and provided with a laterally extending link engager, a lever having long and short arms pivoted to said support and extending transversely of said stem, the short arm of



No. 170,103. Thermal Gas Valve.

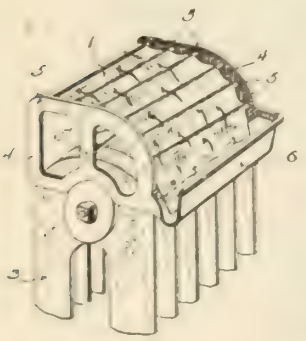
said lever engaging the outer end of said stem and holding it in open valve position against the pressure of said spring, and a fusible link connecting the long arm of the lever to said link engager.

3. In a thermal cut-off valve, the com-

bination of a casing, a packed longitudinally movable stem therein, a spring within the casing exerting its pressure upon said stem to press it toward valve closing position, a lever pivoted to said casing adjacent to the outer end of said stem, one end of said lever engaging said stem and the other end thereof having a finger pivoted thereto, and a fusible link connecting said lever with said casing and thereby holding said stem in open valve position against the pressure of said spring.

4. In a thermal cut-off valve, the combination of a casing comprising a pipe connecting member, a spring enclosing sleeve at one side thereof and a packing nut, a longitudinally movable valve stem extending through said sleeve and having a lever receiving hole at its outer end a stiff spring within said sleeve and exerting its pressure upon said stem to press it toward valve closing position, a lever support secured to said sleeve and provided with a laterally extending link engager, a lever pivoted to said support, and having long and short time lever extending into said hole in the valve stem, a finger pivoted to the other end of the long arm of the lever, and a fusible link connecting said finger with the link engager of said support and thereby holding said valve stem in open valve position against the pressure of said spring

Fig. 1.



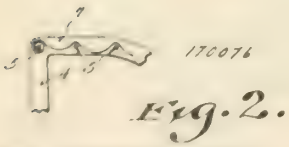


Fig. 2.

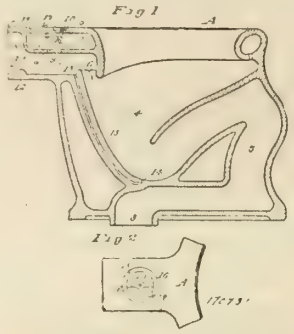
No. 170,076. Radiator.

No. 170,076.

Gustav J. A. Trostel, Milwaukee, Wisconsin, U.S.A., 6th June, 1916; 6 years. Filed 6th April, 1916. Receipt No. 261,207.

Claim.—1. The combination of a frame supportable on a steam or hot water radiator and which consists of end plates and spaced rods connecting the same, the plates being curved upward from the rear of the radiator toward the front, a water trough associated with the frame in rear of the radiator, and a sheet of absorbent material extending from within the trough over said rods to deflect heated air outward from the radiator in a purified and moistened condition.

2. The combination of a frame supportable on a steam or hot water radiator, and which consists of end plates and spaced rods connecting the same, the plates being curved upward from the rear of the radiator toward the front, a water trough associated with the frame in rear of the radiator, and a sheet of absorbent material extending from within the trough over said rods to the front one of the same on which it is wound, the canopy formed by said frame and sheet of absorbent material serving to deflect heated air outward from the radiator in a purified and moistened condition.



No. 170,732.

Water Closet Bowl.

No. 170,732.

Alexander D. Grant, San Jose, California, U.S.A., 11th July, 1916; 6 years. Filed 4th February, 1916. Receipt No. 261,163.

Claim.—1. In a toilet, a bowl having a water inlet at the upper rear gate, a container for a solid soluble disinfectant located above said inlet, and having openings in the bottom, a chamber formed below the inlet, and the container to receive the solution, and a passage formed in the bowl and leading from said chamber to the bottom of the bowl.

2. The combination with the water inlet opening of a toilet bowl, of a perforated container located in said inlet opening, said container adapted to serve as a receptacle for a disinfectant which is in a solid but soluble state and means located relative to the inlet opening and the disinfectant container to direct a portion of the finishing water through the container when the toilet is flushed.

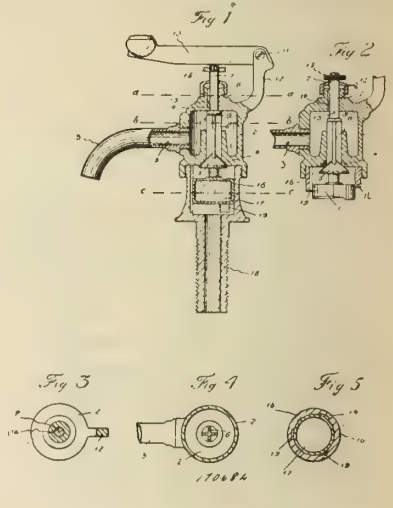
3. The combination with the water inlet opening of a toilet bowl, of a perforated container formed in said inlet opening, said container adapted to serve as a receptable for a disinfectant which is in a solid but soluble state, a barrier located in the inlet opening below the disinfectant container to direct a portion of the flushing water through the container when the toilet is flushed, a second barrier mounted forward of the first-named barrier member to form a pocket below the disinfectant container, and a drain passage formed in the bowl connecting said pocket with the lower portion of the main chamber in the bowl.

4. The combination in a toilet bowl having a water inlet, of a receptacle located in the path of the flow of water and containing a soluble disinfectant, and means to discharge said disinfectant solution into the bottom of the bowl.

No. 170,684.

Jefferson C. Ross and Charles P. Eastman, assignee of a half interest, both of Vancouver, British Columbia, Canada, 11th July, 1916; 6 years. Filed 21st September, 1915 Receipt No. 256,171.

Claim.—1. A water faucet comprising in combination, a hollow cylinder to one end of which the water service is connected, a valve body connected to the other end of the cylinder in the end of which body so connected is an aperture from the cylinder to the delivery outlet from the body, a buoyant piston endwise movable within the cylinder, a valve separate from the piston and seating on the cylinder side of the aperture in the body, and a valve operating from the valve and passing axially through the opposite end of the valve body to that in which is the valve.



No. 170,684. Water Faucet.

2. A water faucet comprising in combination, a hollow cylinder to one end of which the water service is connected, a valve body connected to the other end of the cylinder in the end of which body so connected is an aperture from the cylinder to the delivery outlet from the body, a buoyant hollow piston endwise movable within the cylinder, a valve separate from the piston and seating on the cylinder side of the aperture in the body, and a valve operating stem separate from the valve and passing axially through the opposite end of the valve body to that in which is the valve.

Continued on page 36.

A Parable of Progress

SAID the placid pool to the rippling rill,
As it rollicked near by on its race down the hill
"O, stay with me here! It is foolish and wrong
For you to forever be rushing along.
Stay here on the heights, for as sure as you flow,
You will only sink further and further below.
You are noisy and boisterous—be quiet and hear
The choir of the songbirds carolling near.
Be contented, my brother, and patiently try
To remain where the God of the clouds made you lie.
It is wiser and easier far to lie still."
Said the placid pool to the rippling rill.

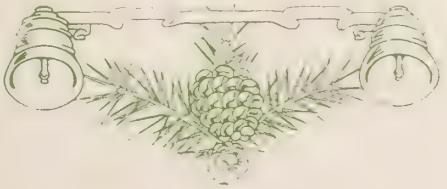
SAID the rippling rill to the placid pool,
As it lay in the shadows, so quiet and cool:
"I know it is easy and pleasant to stay
In one's flower-circled bed on the hillside all day:
That each leap leaves me lower; and that, as I flow,
A desert of death may await me below,
But some spirit impels, in such magical way,
That I feel it is better to simply obey.
And somehow, as onward I leap in the night,
T'ward the strange, distant valley, I know it is right,
And that safety is sure if I keep Nature's rule."
Said the rippling rill to the placid pool.

SO the placid pool lay selfishly still,
Reflecting the stars and the sunshine, until
Its purity paid the high price of its peace:
Its waters grew stagnant; its very life-lease
Was cancelled in scorn by the sun overhead;
And the placid pool died in its flower-circled bed.
But the rippling rill, as it sped on its way,
Grew larger and deeper and stronger each day.
The sunshine strewed gems on its breast as it ran
To do useful service for Nature and Man.
It grew to a river, and when duty-free,
It found permanent peace in the infinite sea.

C.W. CASSON.

Compliments of the Season

SINCERELY hoping that every reader of THE SANITARY ENGINEER will be blest with a peaceful Yuletide. That the close of 1917 will have seen the end of this dreadful war and the dawn of that time when wars will be no more.



THE SANITARY ENGINEER

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DECEMBER 15, 1916

MERRY CHRISTMAS

THIS year [illegible] with its [illegible] and its successes. [illegible] "Why" Why did it ever [illegible] Why is over" Why is the spirit of [illegible]

[illegible] these persons in all lands, [illegible] wish us "A Merry Christmas" time, did not live the spirit of their wish during 365 days of the year: because there was no [illegible] power to [illegible] good-will towards men" in actual fact. The honey of peaceable times had in it the sting of the bee, and when a bee stings a person, it pains the person, but kills the bee.

No insect resembles the German people as a whole more than does the bee. Their progress was appreciated the world over, they sold their honey, the results of their labor to all the world, and the world was a free market for them. But they thought they were being attacked, they were carried away with jealous, foundationless fears and the sting was used. The sting is paining the world, but death [illegible]

"Merry Christmas!" Who can wish "A Merry Christmas" these days when war and pestilence are running rampant throughout the world? Why not [illegible]h and every one, every day, the wish of every [illegible] Christmas on earth [illegible] Christmas day.

Why not conduct one's business every day in a [illegible] the spirit of good fellowship [illegible] ry man's word being yea, yea or nay, nay? Stamp out the law of the survival of the fittest.

[illegible] soul, that immortal portion in the [illegible] [illegible] [illegible]

goods, and, to the words of C. W. Casson's poem entitled "The cry of a soul," listen

"O, Thou, my other self,
In thy mad rush for power and pelf,
Hast thou no pity for the soul oppressed
Within the prison of thy breast?"

At birth came I into thy charge,
To live in limits mean or large,
As thou thyself decreed
By selfish act or noble deed.

"To fall or fly,
To live divinely or to basely die,
Was nature's dual dower to me.
To be accepted or annulled by Thee.

Thou hast denied the higher force,
Hast bound my wings, and padlocked my resource,
Hast robbed me of the heritage of God,
And flung me to the level of the clod!"

* * *

CLEAN BUSINESS METHODS

IT is almost painful to note the foolish spirit of antagonism which manifests itself between men in like businesses these days, and particularly so when so many lend themselves to using and making untruthful statements. Why not be fair? Why not be honest in all our dealings with each other?

Why should we put more effort into "landing an order" than earning lasting repect?

Many a fine fellow "on the road" has lost all respect which he once enjoyed, because he did not stick strictly to the truth. The bearer, or shall we call him the "repeater" of a statement the veracity of which is doubtful is almost as bad as one who deliberately makes a statement which he knows to be false. Why traffic in such foolish slander?

The same with procuring goods at less than a

fair price. How can a sanitary engineer expect to get a fair rate of payment for a job if he himself indulges in price cutting when buying?

Here is a sample of what some men will do to get an order: "Look here Jones, if you will give me the price Brown quoted, I will meet it with a 10 per cent. discount and guarantee the goods equal to Brown's."

Any business man who will do business on such a basis should be ostracized, he is not a fit person to do business with, and if he makes money on such a basis, it is self-evident that he is not giving the value which Jones can give and is giving.

No concern to-day can conduct a business on such a basis and be honest to themselves and those from whom they buy, and the party who procures goods at less than value is responsible in an indirect way for the failure of those from whom they procure their goods.

Let the coming year see the beginning of a new era, when business men will co-operate one with another for a common good, for the simple reason that when there is a lack of unity among men in any one line of business there is a certainty of failure, which is just as sure as that a house divided against itself is bound to fail.

* * *

A PROVINCIAL PLUMBING BY-LAW

ON another page is published the concluding article re that portion of the Ontario Health Act which describes what the law allows regarding plumbing construction. No doubt readers of THE SANITARY ENGINEER will be interested to know that a strict plumbing by-law is now under consideration, and will be enforced to the uttermost. It would therefore be well for those that are engaged in plumbing construction to study the best practice so they may be able to better adapt themselves to the law when it does come into force.

With this in view it is proposed to publish a series of articles which will bear upon some of the chief points as to why certain methods constitute the best practice, and why certain conditions cause the various pipes to be necessary.

The laws of physics will be taken up as far as they are applicable to sanitary engineering construction and they will be dealt with in as simple language as possible. No complicated formulas will be used, and no highly technical phraseology will be indulged in. Therefore readers of THE SANITARY ENGINEER are asked to retain their back copies for reference, although we will endeavor as far as possible to see that every article is complete in itself.

These articles will prove invaluable particularly to the sanitary and heating engineer in the small country towns. The series will commence in the January 1st issue, which will be the eleventh volume of the paper. Those who have not renewed their subscription should do so at once and thus avoid all risk of missing a copy, not simply for the sake of getting every article, but rather with a view to seeing how and why certain laws are necessary, which will also prove the need of a strictly enforced and well modeled provincial plumbing by-law.

* * *

GOOD BUYING

THERE can be no doubt of the need of watching the metal market these days, not merely as a guide to wise buying, but also selling.

Certain conditions seem to warrant present rise of metals which is caused not merely by the increased demands brought about by the war, but rather by the shortage of labor, which, of course, is due to the fact that so many millions of men are engaged in destruction instead of construction.

However, be that as it may, prices are anything but steady and the person who has a big stock of anything made of metal is fortunate in so far as he takes advantage of the present prices. Boilers and radiators have taken another rise. Soil pipe and fittings must go up if manufacturers cover their cost of production as in normal times.

There are, of course, one or two manufacturers who have allowed their prices to stand so long as stocks of metals last. But when the rise comes with them it will be an abnormal rise. We would strongly urge every sanitary and heating engineer to take stock soon and watch values as closely as possible.

The market quotations shown on pages 18 and 19 show how active prices have been since last issue and by paying strict attention to these pages, a greater degree of buying and selling safety will result.

A PRACTICAL OPPORTUNITY

BAD as no doubt it is, we must face the problem of providing some less physical occupation for our wounded soldiers. Many of the best and most skilled men will be and are already among the wounded; some with limbs amputated, some physically weakened which will prevent them doing manual labor.

How can they be provided for so as not to make them feel they are objects of charity? By giving them positions such as salesmen, bookkeepers, estimators and in a number of ways. Scores of sanitary and heating engineers are there who should open stores, become merchants and put these men in charge; become merchants and fit these men by giving them a training which will not only help them, but also put the trade into more of a business class. Cut out the workshop in the backyard or basement and make the store pay some of the overhead. Sell goods and make profit by the selling; bigger bank credits will be the results and less failures in the trade will be seen.

Christmas Greetings

Montreal, Que., December 15th,, 1916.

To the Members of the Canadian Society of Domestic, Sanitary and Heating Engineers:

Another year is drawing to close and a New Year will soon be heralded in. What has the year been to you? What have you accomplished during the year 1916? Have you done, or are you doing for yourself and your fellow-members what in your heart you feel is your duty?

There are to my knowledge quite a number who have done well and are doing well, not only for the society to which they belong, but also for the craft as a whole.

May their efforts and those of the society receive just reward. May the work accomplished in the year 1916 show good results.

With these few remarks, let me sincerely hope that each and every member of the society and the craft throughout the length and breadth of this grand country of ours may enjoy a Merry Christmas and may the New Year bring lasting peace throughout the whole world.

I am your obedient servant, ALEX. CHARETTE, *President.*

Toronto, Ont., December 15th, 1916.

To the Members of the Ontario Society of Domestic, Sanitary and Heating Engineers:

If we members of the above society were to look back for one year, I suppose we would be very likely to remark that things are about the same. Business, as far as the sanitary and heating trade is concerned, has been no bed of roses. True, this was to be expected. Our country is at war; our men are fighting, shedding their very hearts' blood, and laying down their lives, that our country and the world at large shall enjoy freedom from military despotism.

Now, what are we at home doing? Are we devoting the time we should to the betterment of business conditions? Are we striving to bring about better relationship between members of the craft, and at the same time keeping step with every progressive measure in a technical and mechanical way?

Do we attend the meetings of our association or its business as we should do? All these questions should be put to ourselves, and by ourselves answered, and should be acted upon accordingly. The most educated men in the world tell us that self-examination brings better results than anything else on earth.

Let us, therefore, in the coming year examine ourselves, our words, and our actions, that we may be of greater service to ourselves and our customers.

Wishing every member of the Ontario Society a Merry Christmas and as Happy a New Year as these turbulent times will permit.

Yours respectfully, F. R. MAXWELL, *President.*

Toronto, Ont., December 15th, 1916.

To the Members of the Toronto Society of Domestic, Sanitary and Heating Engineers:

The close of another year is nearly upon us, and our country is still at war. We are fighting for right and lasting freedom, for the rights of the small nations. Using the language of the street, we are in it to help ourselves and the "little fellows."

Just so. In it to help the "little fellow." Which means that we members of this profession that are associated so closely by ties in our daily occupation, are trying to improve conditions in our trade. Those who join our association are like unto the men at the firing line, except that the latter are laying down their lives in their endeavor to stamp out the Hun tyranny, while we at home are merely striving to improve the conditions in our business.

The Toronto Society has done much, and in many ways we are beginning to conduct our businesses in a more up-to-date manner, by watching overhead expenses.

We have joined hands with the local union and a better feeling prevails to-day between employer and employee than has existed for many long years.

Examinations for apprentices are now an actual accomplished fact and the Technical School is proving a boon to those students who will take up the profession in days to come.

These, and many other movements have been carried along, which will no doubt bear abundance of fruit in the near future.

Wishing the trade, members and non-members of the above society a Merry Christmas and Happy New Year, I am

Yours sincerely, F. H. GENTLE, *President.*

Christmas Greetings

TO THE TRADE:

From the Manufacturers of

ONTARIO WIND ENGINE & PUMP CO.
TORONTO

Pneumatic Water Systems

THANKING our many friends and customers in the Plumbing Trade for their kind patronage, and wishing them

A Merry Xmas

and

A Happy New Year

Trusting that the close of 1917 will see permanent peace prevailing throughout the whole world.

Ontario Wind Engine & Pump Co.
Limited

Montreal Toronto Regina

Christmas Greetings

TO OUR MANY FRIENDS AND CUSTOMERS WE EXTEND OUR EXPRESSION OF GOOD-WILL AT THIS FESTIVE SEASON.

MAY THE NEW YEAR HOLD FOR YOU A BOUNTIFUL SHARE OF HEALTH, HAPPINESS AND PROSPERITY.

W. G. Harris, Jun., Vice Pres.

THE CANADA METAL CO., LIMITED

TORONTO, CANADA

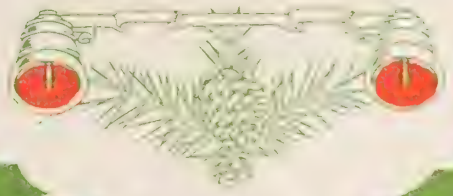
Hamilton Montreal Winnipeg Vancouver

Greeting

To our many friends and customers we extend our sincere wishes for : :

A Merry Christmas and Happy New Year

That ere another Christmas has dawned upon us, this dreadful war will have passed away.



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Season's Greeting

TO OUR MANY FRIENDS AND CUSTOMERS WE EXTEND OUR SINCERE WISHES FOR

A Merry Christmas

THAT THE NEW YEAR WILL BRING LASTING PEACE AND SEE THE BEGINNING OF AN ERA WHEN WARS SHALL BE NO MORE IS OUR SINCERE HOPE.

H. Mueller Manufacturing Co.
LIMITED
SARNIA CANADA

Data Relating to Heating Systems

The Time to Study Heating Systems and Their Requirements is When Such Installations Are Being Installed—Many a Splendid System When Being Installed, Has Been Ruined for Want of a Little Thought.

By T. W. Reynolds.

(Continued from Nov. 15 issue.)

Air Intake Location

THE air intake should preferably be taken from a point opposite the lawn, as this will materially decrease the quantity of dust carried into the dwelling. The recirculating ducts should be constructed on the outside walls and should carry the cold air from the proximity of windows or outside doors directly to a duct under the basement floor which leads to the base of the furnace.

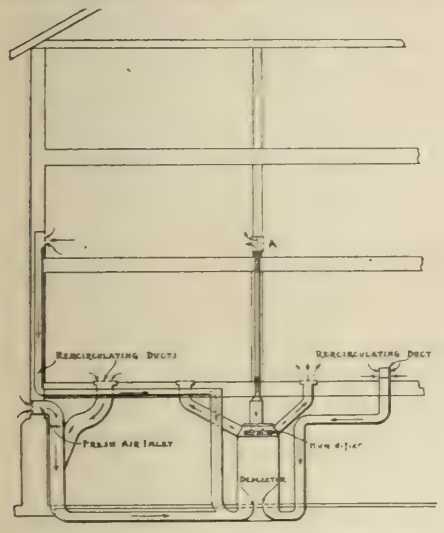


Fig. 12. Warm Air Gravity System.

The supply risers should always be carried up in an inside wall to prevent the unnecessary loss of heat through the walls, and to establish a rising column of air from their outlets along the inside walls. It will in turn descend along the outside walls as it is cooled by contact with same.

The inside system of supply is more positive as regards circulation than when taken from the outside. To a certain extent even the inside supply is affected by winds which may cause a slight pressure or vacuum to exist in the rooms from which such a supply is taken. That the inside supply affects a lesser cost of installation is not necessarily true. It will depend upon the relative location of the boiler and the source of supply.

In some installations the recirculating duct is connected to a register in a hallway where the air is relatively purer and colder, and where the opening is less of a nuisance than when taken from a living room, the floors of which are covered with rugs. It also allows the return of air from the upper rooms.

More recently there has been established a new method of protecting the outside supply, that which is obtained by the use of a cold air room or chamber into which the air enters directly from the outside. The air becomes tempered before passing to the furnace and only the warmer air is withdrawn from the top of the chamber. The effect is to cushion the wind pressure and precipitate the dust on the floor of the chamber.

Ventilation may be secured in connection with indirect heating, the radiating surfaces being located in the cellar with a duct connecting these to the outside for the supply of air, and another connecting to the rooms to be heated. Ventilation by direct-indirect heating is accomplished by locating the radiators directly in the rooms to be heated, which they indirectly heat by air taken through openings from the outside. The air from the outside is first warmed by the radiating surfaces before entering the room.

Either steam or hot water may be used as the primary medium for the methods of heating as defined above, but in each case hot air is the secondary medium which does the actual work of warming the rooms. The whole process is simply a transfer of heat from the steam or hot water to the air. When hot water is used in connection with indirect radiators, the latter should not be equipped with valves, otherwise, with the closing of these in extreme cold weather, freezing of the water might result through stoppage of its circulation.

The indirect system possesses certain advantages. All steam or hot water piping is concentrated in a small space from which the heat effect may be easily controlled. The heating surface is more efficient than for equal amounts distributed within the rooms, due to the increased velocity of air inside the flue which connects to the rooms requiring heat. This increases the heat transmission in proportion to the square root of the velocity; consequently the amount

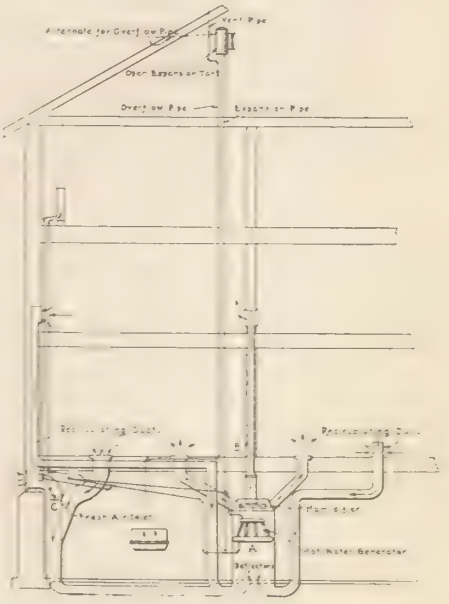


Fig. 13. Combination Warm Air and Hot Water System.

of radiating surface would be decreased over that required when direct radiation is used, if it were not for the fact that the air being taken directly from the outside is colder and must, therefore be heated through a wider range of temperature.

SALESMEN.

By Walt Mason

Throughout the town my ware I holler, and try to sell a new gold dollar for sixty-seven cents; in vain, alas, are all my yellings; in vain I haunt your shops and dwellings, your woodsheds and your tents. No man will buy my handsome money; men seem to think it must be phony, because I'd sell it cheap; so all day long I seek a market, display my coin and boost and bark it, and then break down and weep. But now comes Nestor Newton Neuter, who deals in dollars made of pewter, alloyed with lead and tin; he seems to loaf while I am sweating, and yet men's bundles he is getting, he rakes the greenbacks in. One man has got the trick of selling; he needs to do no frantic yelling to gather in the plunk; he just leans back, his system sunning, and all the people come a-running, to buy his blooming junk. The other fellow strives and labors to sell good plunder to his neighbors, and never gets the kale; no scraps of business can he rake up; there's something lacking in his make-up, he cannot make a sale.

Market Conditions and Tendencies

Statements Regarding the Prices and Trend of Supplies.

THE MARKETS AT A GLANCE

Practically all price changes since last report have been in an upward direction and the end is not yet in sight. Among the many lines on which prices have advanced are enamelware, valves, lead pipe, traps and bends, black and galvanized iron pipe, pumps, etc. Lead is in a very strong position at present and the market holds firm at the high levels recently reached. There have also been many changes in the price of miscellaneous lines, such as nails, files, stove pipes and elbows, etc. The metal markets generally are very firm. Copper has advanced. Tin has been easier of late. All products made of iron and steel are firm in price with prospects of further advances on many lines. In reporting an advance on black and galvanized iron pipe in last issue, SANITARY ENGINEER stated that further advances would probably take place in the near future. The prediction was correct, as indicated by the higher prices announced in this issue.

TORONTO, Dec. 13.—Prices are still soaring and the end is not yet in sight. Among the many lines which have advanced in price since last issue are valves, bath tubs, sinks, other lines of enamelware, lead and waste pipe, lead traps and bends, black and galvanized pipe, oakum and other lines. The lead market is holding firm at the high levels reached recently.

All Valves Have Again Advanced in Price

VALVES. — Considerable advances have again been recorded in almost all lines of valves. The increase is in the neighborhood of 10 per cent. The changes involve compression work, cushion work, Fuller work, basin cocks, bath cocks, flatway and roundway stop and waste cocks, steam cocks, globe, angle and check valves and radiator valves. The demand recently has been heaviest on steam work, manufacturers reporting that they have been unable to take care of the demand. The labor situation is affecting production as skilled workmen are at a premium. There is a firmness in the market and as long as the present condition of affairs exists there is every reason to expect a continuation of the present firm conditions. Following are the discounts on the various lines of work:

	Per cent.
Ground work	50
Compression work, standard	55
High grade	48
Cushion work	40
Fuller work, standard	54
High grade	47
Basin cocks, No. O, standard	49
High grade	49
Nos. 1 and 2, standard ..	49
High grade	40
Bath cocks	55
Flatway stop and waste cockss, standard	53
High grade	50
Roundway stop and waste cocks standard	53
High grade	50
Steam cocks	20
Globe, angle and check valves Standard	25
High grade	22½
Radiator valves, standard ..	30
High grade	30
Patent quick opening valves	60

Bathtubs and Sinks Higher $1.60 Each

BOILERS AND ENAMELWARE.—Advances of $1.60 in the price of enamelware bathtubs and sinks have gone into effect since last issue. The price of a 4 foot, 4½-foot and 5-foot is now $23.70 as compared at $20.10 at the time of last quotation. The 5½-foot size is now quoted at $27.30, which also represents a corresponding advance. In the roll-top sinks the new price for the 18 by 30-inch size is $12.10, as compared with the former price of $10.50. The market in enamelware is very firm and other advances are looked for. Jobbers live in the market only from day to day. They have no lists and a quotation given one hour may be superseded by new and higher lists the following hour. Range boilers have held steady in price and are quoted at the same figures.

30-gallon range boilers, standard	$10.00
30-gal. range boilers, extra heavy	12.50
Bathtubs, roll-top, 4, 4½, 5 ft., 24 to 30 in. wide	23.70
5½ ft.	28.30
Sinks, roll top, 18 x 30 in.	12.10

Lead and Waste Pipe Advance 1c Per Pound

LEAD PIPE.—An advance of 1c per pound has been recorded on the price of lead pipe and lead waste pipe during the week. Lead pipe is now selling at 14c per pound and lead waste pipe at 15c per pound. The discounts on lead traps and bends has also been cancelled. These are now sold at net list, as compared with 10 per cent. formerly. Lead wool has advanced 1c per pound also, and is now quoted at 12c per pound. Lead sheets have also shared in the advance on lead products. On the 3-lb., 3½-lb. and 4 to 6-lb. the increase amounts to ½c per pound. Solder, on the other hand, is easier in price owing to the weaker tendency in the tin market. At the time of writing it is quoted down 2c per pound. Bar solder ranges from 25c to 29½c, and wiping solder from 23½c to 26¼c.

Lead pipe	$0.14
Lead waste pipe	0.15
Traps and bends	net list.
Solder, bar, guaranteed	0.29½
Strictly	0.27
Commercial	0.25
Solder, wiping	0.23½-0.26½
Lead sheets—	
3 lbs. sq. ft, per 100 lbs.	12.25
3½ lbs. sq. ft., per 100 lbs.	12.25
4 to 6 lbs. sq. ft., per 100 lbs. ..	12.00
Cut to sizes, 75c extra per 100 lbs.	

Wrought Pipe Has Advanced 5 Per Cent.

An advance in the price of lapweld and buttweld pipe has gone into effect, which provides for an increase of about 5 per cent., and amounts to $4 per ton on buttweld and $6 per ton on lapweld. This advance follows an upward trend in wrought pipe in the Unted States markets. There is a firmness in the market for all wrought pipe products. Following are the quotations:

Standard Buttweld—	Black	Galvanized
⅛ in.	$ 4 00	$ 5 50
¼ in.	3 42	5 55

⅜ in.	3 42	5 55
½ in.	4 42	5 99
¾ in.	5 41	7 53
1 in.	7 99	11 14
1¼ in.	10 81	15 07
1½ in.	12 93	18 01
2 in.	17 39	24 24
2½ in.	27 50	38 32
3 in.	35 96	50 11
3½ in.	45 08	62 10
4 in.	53 41	73 58

Standard Lapweld.	Black.	Galvanized.
2 in.	$ 20 35	$ 26 83
2½ in.	30 42	40 66
3 in.	39 78	53 17
3½ in.	49 68	66 70
4 in.	58 86	79 03
4½ in.	68 58	92 08
5 in.	79 92	107 30
6 in.	103 70	139 20
7 in.	138 00	182 10
8L in.	145 00	191 30
8 in.	167 00	220 30
9 in.	200 10	263 90
10L in.	185 60	244 80
10 in.	239 00	315 20

Plumbers' Oakum Steady: Other Oakums Advance

OAKUM.—There has been an advance of 1c per pound on certain grades of oakum and 1½ on others. Plumbers' spun oakum, however, has held steady in price and is still quoted at 8c per pound. The demand for the product has been fairly good. Following are the quotations on the various lines:—

Plumbers' spun oakum	$0.08
U. S. Navy (English)	0.15
U. S. Navy (American)	0.18½
U. S. Clipper	0.17
Best American	0.08

Miscellaneous Lines Go Higher In Price

Wire nails are still climbing a further advance of 30c per keg having gone into effect since last issue. The price is now $4.70 base.

Files of all kinds have advanced another 15 per cent. Stove pipe elbows have advanced again and are quoted at $1.70 per doz. for 6-inch and $1.85 doz. for 7-inch. New and higher prices have also been issued on all sizes of common and bright stove pipes.

Pumps Advance To Higher Levels

Pumps, including common cistern pumps, have advanced in price. The general discount on all pumps, iron cylinders, etc., is 35 per cent.; pumps with brass cylinders, 30 per cent.; brass lined cylinders, 30 per cent.; brass body cylinders, 25 per cent.

Metals Generally Hold Very Firm

The outstanding feature in the metal markets continues to be the strong copper situation. Quotations on this metal have again advanced locally, although nominal. The tin market is easier, due to a decline in London, but the position of this metal is fairly strong and a reaction may take place. Spelter is also easier, the demand having fallen off; quotations are unchanged. The strength which recently developed in the lead market has been well maintained, but there has been no further advance in prices. The antimony and aluminum markets are featureless with prices unchanged. Solders have declined.

Copper.—Although the primary market is quieter there is no sign of weakness, the dullness being due to the scarcity of nearby and first quarter metal. It is understood that none of the leading sellers have any copper for delivery before the third quarter of 1917, and metal is difficult to obtain from any source before that time. The market is very firm locally and prices have advanced 1c per pound, electrolytic being quoted at 38½c; lake 38c, and castings 37½c per pound.

Tin.—A declining market in London has been reflected locally, and tin is down 1c, being quoted at 47c per pound.

Spelter. — Further weakness has developed in the market due to lack of interest on the part of buyers. Local quotations are unchanged at 14½c per pound.

Lead.—An active demand for lead in the primary market has developed being induced by the steady price advances of independent producers, and the scarcity of metal for either December or January delivery. The leading interest has raised its price to 7½c New York, it is claimed, for prompt metal, and 8c lead is likely before the end of this year. Local prices are very firm and unchanged in the meantime at 9½c per pound.

Aluminum.—The market is devoid of interest and quotations are unchanged at 68c per pound.

Antimony.—The market is dull and unchanged with hardly any business doing. Local price 18c per pound.

READ YOUR INSURANCE POLICY

The following, or a similar clause, appears in all policies of fire insurance:

"The company is not liable for losses following, that is to say: Where the insurance is upon buildings or their contents for loss caused by the want of good and substantial brick or stone or cement chimneys; or by ashes or embers being deposited with the knowledge and consent of the assured, in wooden vessels; or by stoves or stove-pipes being, to the knowledge of the assured, in an unsafe condition, or improperly secured."

Notwithstanding this, in 1915, there were 51 fires from defective and overheated stoves and furnaces; 62 from defective and overheated pipes, chimneys, etc., and 8 by live coals and hot ashes.

Should the insurance companies take advantage of this clause, many victims of their own carelessness would find themselves without any recompense for their losses.

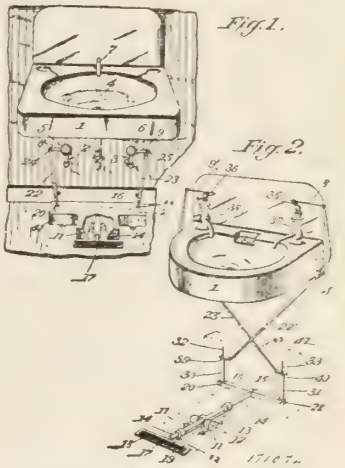
New Patents

No. 171,074.

Eben C. Speiden, Niagara Falls, New York, U.S.A., 25th July, 1916; 6 years. Filed 14th June, 1916. Receipt No. 266,677.

Claim.—1. Lavatory apparatus comprising hot and cold water valves having operating connections, rocking means for actuating one or the other or both of said connections, and a single pedal for rocking said rocking means.

2. Lavatory apparatus comprising hot and cold water valves, a rock shaft, an operating bar connected to said valves, said bar being mounted on said rock



171,074. Valve Mechanism

shaft to oscillate therewith transversely of the axis of the rock shaft and thereby actuate one or the other of said valves, and means for cocking said rock shaft and for independently tilting it to actuate said valves simultaneously.

3. Lavatory apparatus comprising hot and cold water valves, a rock shaft connected with said valves, means for rocking said shaft to thereby actuate one or the other of said valves, and means for tilting said rock shaft to thereby actuate said valves simultaneously.

Rural Sanitation

A Continuation of the Sanitary Science Course That Has Been Appearing in the Sanitary Engineer, But Having Particular Reference to the Sanitary Disposal of Household Wastes in Unsewered Districts.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. C an. Soc. C.E.

ARTICLE 15

SANITARY PRIVIES (Continued).

IN the last issue of the SANITARY ENGINEER, there appeared an article devoted mainly to the Kentucky Sanitary Privy, described as probably the best known of that type of privy.

The term sanitary privy frequently is used to include two general types, the "dry system" and the "wet system." Another classification is (a) removable-receptacle privies, and (b) stationary-receptacle privies. The dry earth closet, for example, is evidently a "dry system" type, and also must necessarily be of the removable receptacle class. Before concluding the discussion on sanitary privies, several (like the Kentucky Privy) that are both of the "wet system" type and also of the stationary receptacle class, will be briefly described.

The criticisms that applied to the method of sewage disposal as obtained by the use of the Kentucky Sanitary Privy may in general be applied to the results from all similar types. While the danger of infection through the carrying or spreading of disease bacteria from human excreta by flies, animals, or surface water, is avoided, the danger of infection of water supplies by seepage of unpurified sewage through the soil is not entirely removed, though frequently minimized.

There is undoubtedly a saving in first cost between the installation of a sanitary privy (a decided improvement over the common dug privy) of the types to be described, and a modern sewage disposal plant and inside water closets. But a number of farmers of Canada have already found, and others will also find, if the matter is brought properly to their attention, that from an economic standpoint, an "investment" in a modern plumbing equipment will give them as good returns as the very latest in farm machinery.

The L. R. S. Privy

The original design was prepared [illegible] by Dr. L. L. Lumsden, Dr. N. Roberts, and Prof. C. W. Stiles (hence the L. R. S.), of the United States Public Health and Marine Service, to meet the need for more sanitary outfits for the [illegible] of sanitary privies in the country.

Fig. 1 illustrates the various features of the type of privy, which is probably not of sufficient moment to the reader to merit further description. But the methods advocated for the disposal of the effluent are of interest from a sanitary standpoint. The designers of this privy wrote in 1910 as follows:—

"Disposal of the effluent.—(1) Heat: If a suitable (metallic) vessel is provided to receive the effluent, a fire may be

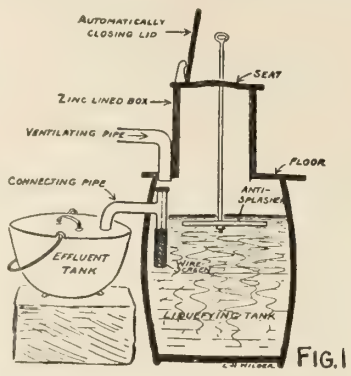


FIG. 1

built under the vessel and the effluent heated to boiling. Or if a wooden or concrete effluent tank is used, the effluent may be transferred to some other vessel for boiling. After boiling, the fluid may be safely used for fertilizer under any conditions. Heat disinfection is the only measure which can to-day be recommended unreservedly.

"(2) Burial: Burial will unquestionably decrease the dangers of spreading infection, but in the present state of our knowledge this method of disposal can not be relied upon as safe. If burial of the effluent is practised, the fluid should be disposed of not less than 300 feet from and down hill from any neighboring water supply, and not less than 2

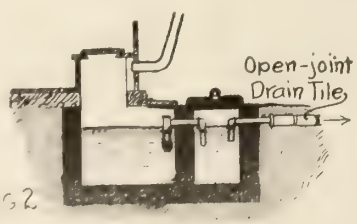


FIG. 2

feet underground, and then only provided the soil itself is a good filter. Burial in a limestone region may contaminate water supplies miles away.

"(3) Chemical Disinfection: Chemical disinfectants, such as chlorinated lime and certain coal tar derivates, have the great advantage of cheapness and can be relied upon to destroy pathogenic bacteria. Our knowledge regarding the action of chemical disinfectants upon the eggs and spores of the various animal parasites is at present very rudimentary, but so far as results are known, their practicable use does not seem to be so efficient in the destruction of the zoo-parasitic as of the bacterial infectious organisms. Therefore, pending further investigations, the use of chemically treated excrement as fertilizer should not be regarded as unqualifiedly safe.

"(4) Chemical Disinfection with Subsequent Burial: Inasmuch as chemical disinfection can be relied upon to destroy pathogenic bacteria, and inasmuch as burial greatly reduces the danger from animal parasites, a suitable combination of the two methods (chemical disinfection and burial), can be used with reasonable safety.

"(5) Sewers: In partially sewered towns the effluent from these privies may be emptied into the sewers. If conditions are such that the addition of this material to the sewage is dangerous, then the entire system needs correction."

Particularly in the south, hookworm, tapeworm, and other worm diseases, are caused by worms that live in the bowels. These worms lay eggs which are voided with the excreta. They are probably most surely destroyed by heat and hence boiling is advised.

The object of burying the effluent not less than two feet underground is no doubt to prevent contamination at the surface of the ground. But, if the facts brought out in these articles have been followed, it will be remembered that at two feet below the surface, the soil bacteria, necessary and useful agents in sewage purification, are comparatively few in number. One foot or less below the surface is certainly to be preferred for purification purposes; there are other reasons, though, which make less than one foot generally undesirable.

The question of chemical disinfection will be taken up in a later article in connection with chemical closets.

In a later bulletin dated April, 1915, relating to the L. R. S. Privy, the following is noted:—

"The effluent from the L. R. S. Privy should be regarded as potentially dan-

gerous, just as are crude excreta, and it should be disposed of accordingly. Since the excreta in an L. R. S. Privy are reduced in amount and liquefied, the matter may be subjected to the natural purification agencies more effectively than the crude excreta can be. On some premises the effluent may with safety be discharged through drain-tile piping directly into the top soil (see Fig. 2). In disposing of the effluent directly into the ground, great care should be taken to prevent the contamination of water supplies. This is particularly important in limestone localities. Chemical disinfectants may be added to the effluent tank and the effluent may be discharged into the soil automatically and periodically."

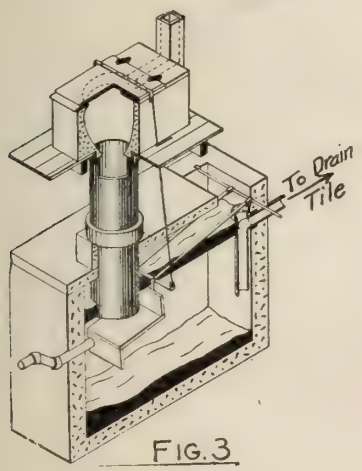


FIG. 3

Fig. 3 shows a modification of the L. R. S. Privy, devised by Prof. H. W. Riley, of the Rural Engineering Department of the New York State College of Agriculture.

The Wisconsin Sanitary Privy

The bulletin descriptive of this privy (see Fig. 4) states that there are eight fundamental requirements to be observed in its construction. These are as follows:—

"(1) It must be located and constructed so that there is absolutely no danger of a water supply being contaminated.

"(2) It must be so constructed that small animals or vermin cannot in any way get to the excreta.

"(3) It must be fly-tight.

"(4) It must be so constructed that it can be kept in a sanitary condition without too much labor.

"(5) It must be one that can be constructed at a minimum cost.

"(6) It must be safe against overturning and must afford a reasonable amount of protection from the climate to the person using it.

"(7) While it is desirable that the privy make as neat an appearance as possible, the appearance must be second to utility.

"(8) The vault must be as dark as possible, but the shelter house should be properly ventilated and lighted."

The water supply to the vault is furnished by means of a gutter and down spout on the rear of the privy, which down spout also acts as a vent pipe. In localities where there are seasons of excessive rainfall, a cut out in the down spout is advised. Sixty feet of drain tile is provided to each seat. With such an arrangement, if the rainfall could only be depended on as to amount and frequency, the result might be entirely satisfactory in regard to the purification of sewage in the soil surrounding the drain tile.

The Indiana Privy

In a bulletin issued in 1915 by the Indiana State Board of Health, what is shown in Fig. 5 is termed "The Indiana Combination Privy, Septic Tank and Sewage Disposal Plant," and is described as "rat and fly proof—almost odorless—no pollution of the ground." An unusual feature, it will be noted, is the depth of the tank which is to be at least 15 feet.

"To start the tank, it must be about three-fourths full of water and about four shovelfuls of rotten barnyard manure added. The manure is added to secure at once the nitrifying microbes which will liquefy and destroy excrement. * * * The outlet pipe may lead to a gully, a ravine, or creek, at least 100 yards away, and discharge the tank liquor into the same. This liquid may

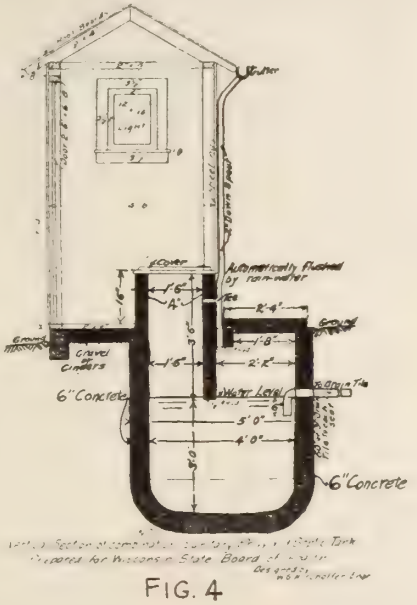


FIG. 4

have a little odor, but it is not poisonous and can carry no disease. A better way for the disposal of the overflow liquid is to connect with an underground disposal tile system. This system can only be used in porous, absorbent soil. Its construction is simple. A main ditch, not over 15, or at most, 20 inches, deep, carries the main tile drain, from which at least eight side (lateral) tiles lead, four on each side of the main line at equal distances apart. The tiles are porous and laid simply end to end in the ditches, the joints being covered with broken stone or coarse gravel. The overflow from the tank is entirely liquid, is not poisonous and never carries disease germs, for they are killed by the stronger nitrifying germs which liquify the fecal matter."—(Extract from bulletin).

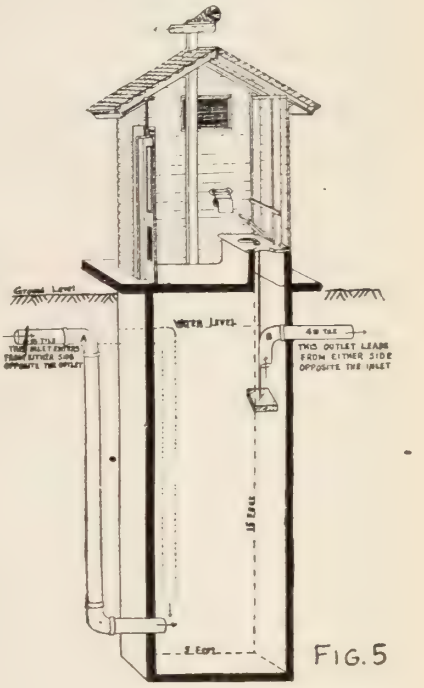


FIG. 5

Most of that just quoted is, as previously explained, entirely opposed to the generally accepted modern theory of the septic tank, which is to the effect that the liquid from the tank, not having been oxidized, is not purified. Further, while it is generally conceded that disease germs do not multiply in a septic tank, it is quite probable that certain numbers of typhoid fever or similar germs may live for some time in the septic tank (especially if encased in small particles of suspended solid matter) "appearing in the effluent a long time after they enter the inlet," according to Mr. George W. Fuller, Consulting Engineer and Sanitary Expert.

(Continued next issue).

NEW BOOKLETS

The Crandon Mfg. Co., Bellows Falls, Vermont, U.S. are distributing some very interesting and highly illustrated booklets describing their line of heating specialties, particularly the heat regulators and automatic damper regulators, which are suitable for steam, hot water and warm air furnace control. Copies can be procured by writing to the above address.

Ontario Sanitary Plumbing By-laws

How the Provincial Government Can Assist the Ontario Sanitary Engineers, if a Little Voluntary Assistance is Given the Government.

IN the last issue, that part of the Ontario Health Act which dealt with plumbing construction was published. and it was urged that every sanitary engineer should take a little more interest in seeing that the letter or spirit of the law was carried out.

For instance, a few months ago a school was built, which, when completed, would cost in the neighborhood of $50,000. A large septic tank had to be built and several thousand feet of field tile pipe laid.

A very fine basement was built and sanitary fixtures installed, and to enable the waste water to drain into the septic tank, a false floor had to be raised nearly three feet. This was done, but the filling in, of course, consisted of ashes and other rough lime, waste material, shavings, bits of chips and the like. Steps had to be constructed up to the lavatory floors, and further, light-weight lead waste pipe and lead bends were used. Now, what will happen if any of these pipes begin to leak?

The leaks will find a way through the filled up rubbish, and it may be months before the trouble is detected. What will happen then? The plumber, first of all, will be blamed for the leaks, and to some extent he will be to blame. All because he felt that to procure the work he had to tender a low price, and thinking that as there were no strict by-laws governing plumbing, that light-weight lead could be used, and vents and the like could be dispensed with.

What should have been done in this particular case is that a well ventilated sump pit should have been built and a small electric sump pump installed to operate automatically into a dosing chamber. The cinders and ashes used would have been invaluable in the disposal bed around the tile pipes, and the waste and drain pipes would have been laid in clay, which would have been better than in cinders.

Fig. 1 was shown in last issue, but it is being reproduced along with Fig. 2 so as to give the reader an idea of a whole equipment, plumbing and sewage disposal system together. There should never be a trap placed between the main soil pipe stack and septic tank.

The septic tank should be properly ventilated. This can be most effectively done by having a clear, unobstructed air passage from the breather shown at the septic tank.

It may be advisable in very cold climates, where the temperature drops and remains at from 15 to 50 degrees below zero, to cover the breather over with a loose layer of straw manure. The length of the soil pipe stack and the warmth of same will draw sufficient air through to ventilate the septic tank.

One thing which every self-respecting sanitary engineer should refuse to do is never to have anything whatever to do with installing a cesspool, nor should he ever leave a system of plumbing incomplete, or in such a condition as to enable any other person to connect same to a cesspool.

We sanitary engineers have been held up to ridicule more because of having

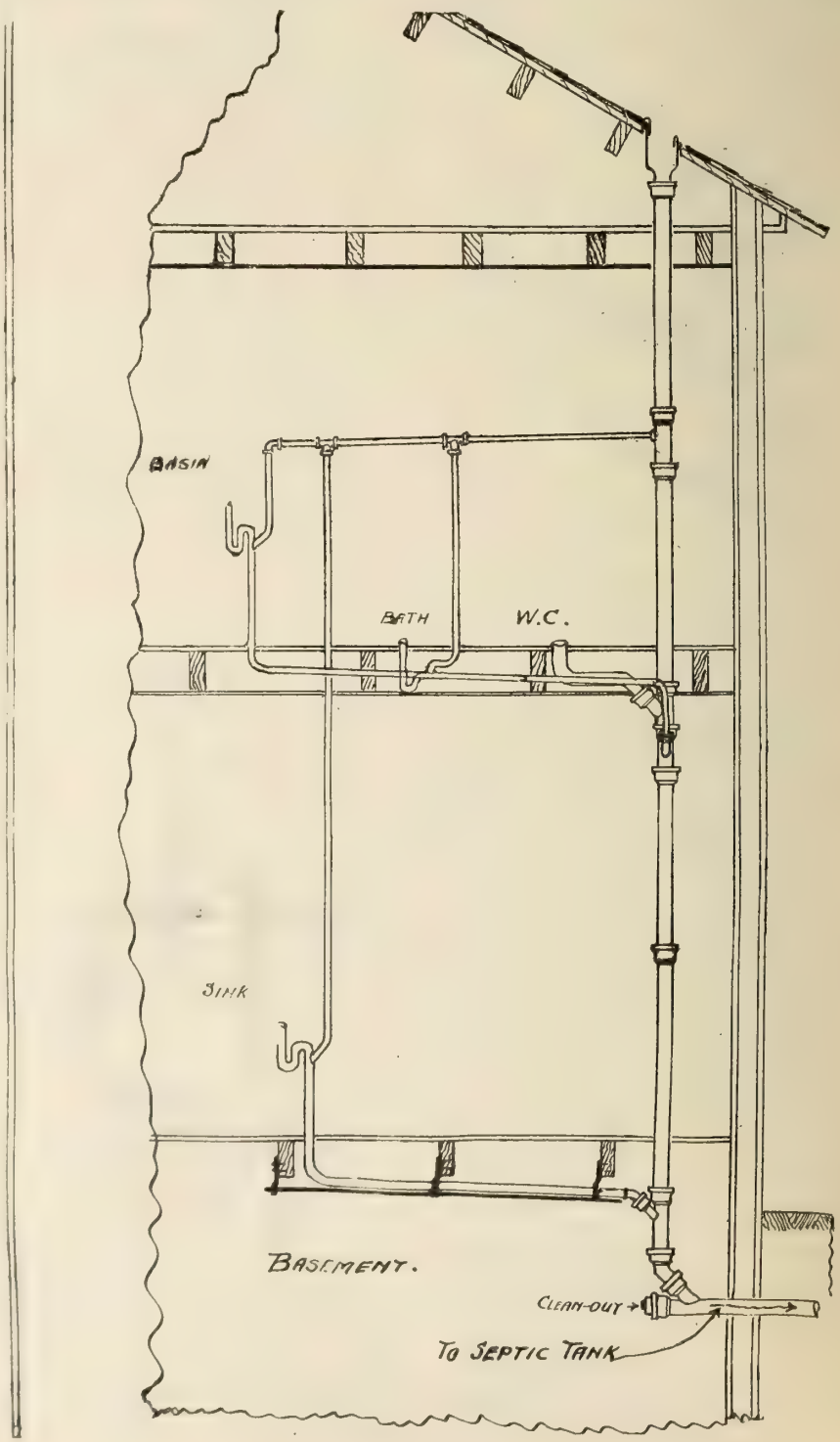


Fig 1.

installed work to meet the price than for any other reason, and if we claim the title of sanitary engineers we impose upon ourselves a responsibility which make us true custodians of conditions which should be sanitary. We should stand on our dignity and see to it that each and every installation of plumbing be installed according to the very best known practice. Whether we instal the appliances or not, we should be ready to guard our own reputation by informing the powers that be what is being done. There should be no sentimental feelings about the matter. If one member of the craft secures a contract by installing a poor system which could not be classed as good practice, the owner should be shown the difference, and the Health Department should also be notified.

It is only by our taking such a stand that the public will begin to realize that sanitary engineers are out to give them a square deal, and that we are trying to live up to the full dignity of our calling.

PUBLIC COMFORT STATION FOR TORONTO

A deputation representing the Canadian National Exhibition Association and consisting of Messrs. Noel Marshall, Joseph Oliver. Dr. J. O. Orr, Geo. Gouinlock, and Ald. Sam McBride appeared before the Board of Control recently to ask for the privilege of taking sufficient money out of this year's earnings to provide adequate lavatory acommodation at the Exhibition grounds. Mr. Noel Marshall said the cost of the lavatories would be about $25,000, but that amount would not interfere with the Exhibition directors handing over to the city a surplus of more than $25,000. The city had provided for a revenue of $25,000 from the Exhibition this year.

NOTE

The accompanying drawings show the piping layout for a house of plumbing and sewage disposal system, providing the spirit of the Ontario Provincial Health Act is carried out.

The septic tank shown is in accordance with the best practice for an ordinary residence. Note the general layout which is in proportion to the house.

Of course the fact that the Act is not being rigidly enforced, makes it possible for any kind of installation to be constructed.

Our chief argument is that the Act could be carried out if a few sanitary engineers would co-operate with the powers that be, and refuse to install any work, not within the spirit of the Act, also informing the Provincial Health Department of any work done which is not in conformity with the spirit of the Act.

Mr. Joseph Oliver said the city would get more than $25,000 from the Exhibition after the money for the lavatories had been provided.

Controller Cameron said there was no room for argument. He expressed surprise that 100,000 people should get along without serious complaint about the inadequate lavatory accommodation.

Controller Foster thought that owing to it being war time the request should be very seriously considered. He did not think the money should be spent without deliberate consideration.

Ald. McBride said the war conditions made it all the more necessary why the lavatories should be built.

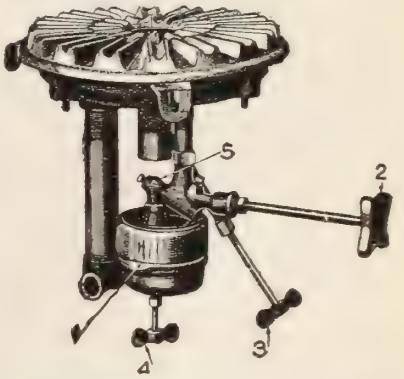
The board decided to recommend to Council that permission be given to the Exhibition Board to make the necessary Improvement.

A NEW BURNER GASOLINE

When gasoline is used to heat water in the place of regular coal gas, there is required a very different type of burner.

The Hotstream Heater Co., Cleveland, have put on the market just such a burner as is needed.

The gasoline passes through a gravel filter to relieve it of all impurities. The



New Gasoline Burner for Gas Water Heaters.

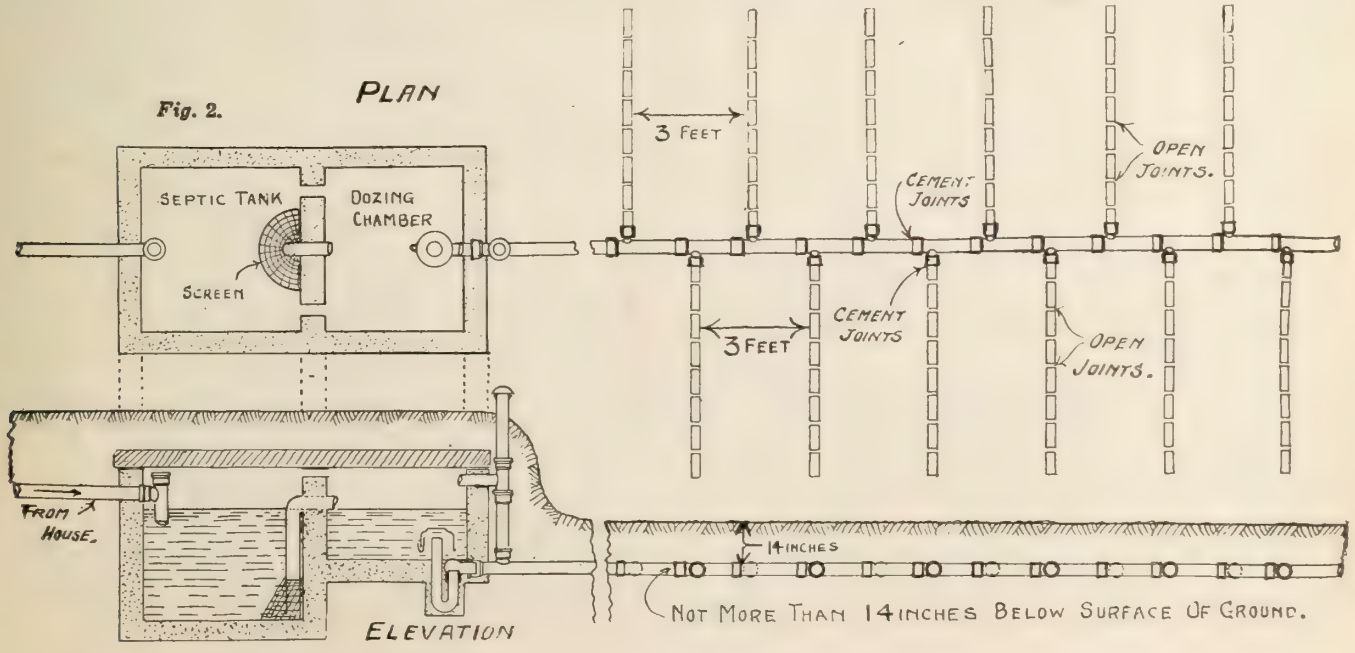
burner is of the saw type, burning a sharp blue flame.

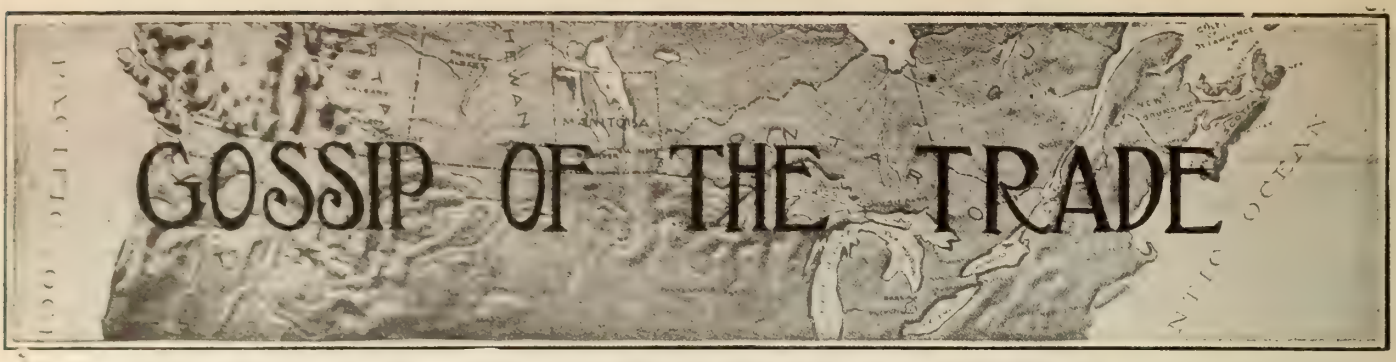
To generate the gas on a cold burner, after burning the gasoline in the cup, the pilot light is turned on.

The pilot burns very little gas itself, and by letting it burn constantly when the heater is not in use, it keeps the burner hot ready for instant lighting.

This burner is said to consume about one gallon of gasoline every six hours, steady burning at full force, and is said to be giving the best of satisfaction.

Fig. 2.





ONTARIO WIND ENGINE & PUMP CO. APPOINTS ONTARIO REPRESENTATIVE

We have just been informed that the Ontario Wind Engine & Pump Company of this city have completed arrangements with Mr. C. S. Milne to undertake the direction of their selling organization in Ontario. Mr. Milne will assume his new duties on November 1st.

The above firm have for many years been active in the promotion of rural trade in the pneumatic system of water supply, and have been very successful. On account of the fact that they were originally established and experienced in the manufacture and installation of all types of gravity water systems, they were able to approach the pneumatic proposition in a thoroughly practical way. The natural result is that no outfits of questionable merit have ever been placed in the hands of the public by them. No new scheme or invention has been experimented with at the expense of the public, for the reason that a satisfied customer is recognized as the firm's best possible advertisement.

We are confident that the policy of the above firm, as outlined by Mr. A. T. Thom, general manager, backed up by the selling force under the direction of Mr. Milne, will prove highly beneficial to sanitary engineers in rural districts, who are interested in the installation of pneumatic water supply systems. Of one thing we are sure, and that is, that any sanitary engineer requiring information, assistance or advice, regarding the installation of pneumatic water systems, would make no mistake in consulting this firm.

We wish Mr. Milne every success in his new position.

MODERNIZING HOMES IN PETERBORO

Alderman Edgar's (Peterboro) suggestion that the Utilities Commission instal sanitary plumbing on loans to be paid by the owners in a period of ten years was passed on to the Commission by the Fire, Water and Light Committee last night with Alderman Edgar and Alderman Evans a sub-committee to present the idea. Alderman Edgar considered that this might materially assist in decreasing the number of outhouses in the city. The cost of plumbing for a closet in a house 15 feet from the street line would cost about $110. This money could be provided by ten-year debentures costing $14.67 a year, or $3.67 a

C. S. MILNE.

quarter. Water rates would be increased thereby, and the total cost to the householder would be $5.09 per quarter until the work was paid for. The cost could be registered against the property through a mortgage.

Members of the committee were dubious about the operation of Alderman Edgar's idea, but were content to have the Utilities Commission discuss it.

Low Figures

Commenting upon the above suggestion of Ald. Edgar's, it would appear that the figures were very low, and of course the work and material could not fail to be poor quality too, unless as mentioned simply a water closet be installed.

But is our worthy friend convinced that a closet is the only fixture required in a house to make it modern?

Many people appear to be of the opinion that a W.C. is the most important fixture in a plumbing system.

Such is not by any means the case. A dry earth closet outside and kept clean, along with a bath, lavatory and sink inside the house would be far more sanitary, than a house with simply a W.C. only, with no provisions to dispose of the wastes from a sink. And it must be admitted that a person now-a-days requires a bath if one is to be personally sanitary and kept in good health.

THE SANITARY ENGINEER has no doubt whatever, but that Alderman Edgar's scheme is already in practice in many cities on this continent but merely the installing of a W.C. is not to be commended for one moment.

PLUMBING CLASS

Several Apprentices Are Now at the Technical

The Hamilton craft are making splendid strides these days in their endeavors to better the conditions for the coming men in the science of sanitary engineering. Twenty-two registered plumbing apprentices joined a technical school class, Dec. 6, and Harry Coates, member of the Hamilton local union, was appointed demonstrator and lecturer by Principal George Sprague. The class will start on January 7, and a full equipment for practical and theoretical plumbing instruction will be on hand. The boys will meet two nights each week and should they desire more tuition, the local union will arrange an additional meeting in the Labor Hall, to be supervised alternately by the union members. Mr. Coates is well grounded in technical matters, having been officially connected with several of the largest institutions in England. He is practical and skilled in plumbing and steamfitting.

DOING HIS BIT

Among the most popular boys in and around Toronto for a good number of years, none were held in higher esteem

than Ernie Laidlaw, now Capt. Ernest J. Laidlaw. He took a great deal of interest in hockey playing and was a good sport himself at the national game. He also officiated for some time as manager of the Argo's Rugby team, in which position he showed great enthusiasm. In business as in pleasure, Ernie was no back number, and for some time represented the Standard Sanitary Mfg. Co., Ltd., Toronto, in the Western Ontario territory.

About a year ago Mr. Laidlaw was appointed the manager of the Toronto branch of Warden King, Ltd., of Daisy boiler fame.

CAPT. E. J. LAIDLAW.

He is a member of the Toronto Board of Trade and is single (yet), we are told.

The early part of the year Mr. Laidlaw felt that he could do better for his country by assisting to settle the war than by selling Daisy boilers. Enlisting in the 198th Battalion of Canadian Buffs, he very soon qualified as captain.

Judging from his past record, everyone can rest assured that Capt. E. J. Laidlaw will not be lacking in showing what Canadians can do for their King, country, and for freedom.

The SANITARY ENGINEER wishes to join his many friends in according him a hearty God-speed, and after he has helped to give the Kaiser his just reward, may we have the pleasure of seeing him safely returned.

ANNUAL CONVENTION OF THE SALESMEN OF THE ONTARIO WIND ENGINE AND PUMP COMPANY, LTD.

It would be hard to find a crowd of men anywhere that could exceed in optimism and enthusiasm the one which gathered at the offices of the Ontario Wind Engine & Pump Company last month. It was the annual conference of travelling salesmen and department heads of the firm, which was called earlier than usual in order that the men might have an opportunity of becoming acquainted with the new sales manager, Mr. Milne.

The salesmen were the chief sources of optimism, as they have been all through the country and know that farmers everywhere are prosperous and are spending money on comfort producing improvements more than ever before. This is particularly true of water systems and sanitary equipment. The travellers were unanimous in the opinion that more water systems will be sold to farmers in 1917 than ever before.

One point was brought out clearly, however, and that was that the plumber certainly must show the residents in his locality the benefits and comforts that may be had through the installation of sanitary conveniences. A water supply and plumbing system is as indispensable to the farm as a cream separator but cannot be sold from an office any more than the separator can.

At the close of the convention, all who were present expressed the belief that farm trade in sanitary and other improvements will be greatly incerased during 1917.

NO JOKE

The following clipping appeared in the Toronto *Star* recently, which goes to prove that the name plumber, with all its jibes and jokes, should be cut out. There are no plumbers in Canada, or even in the world, for that matter, except possibly in England, and those who really do true plumbing are not sanitary engineers. The concern referred to recently formed a partnership, and should never have adopted the title of "plumbers and steamfitters." However in this particular case they received a little free advertising:

First Prize Story.

From Toronto *Star*

Here is an amusing thing I heard at the Peter Pan Theatre. The advertisement was flashed on the screen, "Bloomer & Chipperfield, Plumbers and Steamfitters, Queen Street East." A small boy sitting near me looked up and said, "Is it comic?"—Knowles Bailey.

JOINS CANADA METAL STAFF

Not a few readers of THE SANITARY ENGINEER will be interested to learn that E. A. Rogers has joined the staff of the Canada Metal Co., Ltd., Toronto.

To start at the beginning of friend Rogers' career in the plumbing trade means looking back a little while. A native of London, Ontario and serving his time as a plumber with the highly esteemed old pioneer Plumber (with capital P.) James R. Haslett senior, Mr. Rogers learned the honest calling of plumber. Any one coming in contact year in and year out, day in and day out with the "beloved James R." could not fail to respect the plumbing profession, and when interviewing Mr. Rogers and mentioning Jas. R. Haslett, one could see that many pleasant memories encircled those apprenticeship days.

It is not very often one has the pleasure of speaking to a traveller who has risen from the ranks of the plumber of days long past, but such is the case here.

E. A. ROGERS.

Mr. Rogers' first experience as traveling salesman was for 20 years with the James Morrison Brass Mfg. Co., followed by 11 years as representative of the James Roberston Co., Toronto. In the year 1905 Mr. Rogers founded the late National Plumbing Supply Co., Toronto, holding the position of vice-president for a period of 9 years. The latter concern was some months ago taken over by the Empire Manufacturing Co. of London.

After a well earned rest our worthy friend has taken up a position in the plumbing supply branch of The Canada Metal Co., Toronto.

NOW SERGEANT

W. J. Worthington, who for some time was engaged as shipper at the Warden King Co., Toronto branch, enlisted some time ago for service overseas. At the time of enlisting he was appointed company quartermaster, but has since qualified as a sergeant in the rank and file. His company, we are told, expects to be right in the fight before very long. We all hope he will ship the boys a lock of Kaiser Bill's hair as promptly as he got out the orders for Daisy boilers and radiators.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

CAUSE OF WATER HAMMER

The Editor Sanitary Engineer.

I would be pleased if you would describe the phenomenon and cause of water-hammer in water pipes.

I wish to say that I find your paper very valuable indeed, as it is so practical.—R. R. G. G.

Water-hammer is a term applied to a condition or action which is set up by sudden concussion of water enclosed suddenly or only partially relieved, that is when in connection with cold water service pipes.

There are however two causes for water-hammer. One is the sudden opening and closing of a faucet which is not furnished with an air chamber. Until the fuller type of faucet was introduced "water-hammer" was not quite as frequent a trouble. Another thing will cause what is sometimes termed "water-hammer" but is really not, is a partially opened faucet which has some loose part in it, the water acts upon the loose member in very much the same way as a vibrator in a barber's pneumatic massage apparatus, and if the faucet is opened full, the hammering will cease just as it will if closed tight.

Professor S. B. Bennett, a graduate of the Armstrong College Newcastle on Tyne writes as follows:—

"Water-hammer in pipes. — This peculiar noise occasionally heard in water pipes often causes much annoyance and unnecessary alarm. An interesting apparatus made of glass, to illustrate the water hammer in pipes can now be obtained which explains clearly the cause of this knocking noise.

"The apparatus mentioned consists of a glass tube 6 or 8 inches long, and about ⅝ inches in diameter, one end of which is closed and a bulb about 1½ inches is blown on it, the bulb is then filled partially with cold water and the water is raised to boiling point to expel the air in the tube, and the end of the tube then hermetically sealed. When allowed to cool a small quantity is obtained, contained in a partial vacuum in the sealed tube, if the apparatus is now held horizontally and moved sharply backwards and forwards a knocking noise is heard similar to the bumping or knocking noise in the water pipes.

"Thus it will be seen that the noise in the water pipes is caused by the water falling in a partial vacuum and when the water comes in contact with something firm or rigid to check its fall, the knocking noise is the result."

In the next issue we will explain a few remedies for water-hammer as well as give the reason for water-hammer in steam and hot water systems.—Editor.

LOW PRESSURE AND VACUUM

Editor The Sanitary Engineer.

Can you tell me what difference there is between a low pressure steam heating system—less than a pound I mean—and a vacuum steam job? What I mean by this is: I have installed a steam job, and it is heating fine when heat is on constantly—that is, when there is a fairly good fire, even though there is no pressure on the gauge, and the air has been let out of the radiators; but as soon as the fire goes out, or is low, some of the radiators get water in them, and if the air valves are open and the steam is down, the water will go back to the boiler. This has led me to think that some vacuum has been created in the radiators, or else what can it be that stops the water from getting back to the boiler? It is a one-pipe steam system I am referring to.

STEAMFITTER, S. S. E.

In the first place, it must be remembered that gauge pressure at zero—that is, when no pressure is registered on the gauge, is really 14.7 lbs., or in round figures, 15 lbs. pressure. Everything on this earth is being subjected to an atmospheric pressure of 15 lbs. at sea level.

Now, suppose the gauge registers 1 lb., there is really 16 lbs. pressure absolute, and so on, and the temperature of steam at 1 lb. plus atmospheric pressure, or 16 lbs. absolute, will be about 215 degrees Fahr.; but if there is a 1-inch vacuum on the system, it means that there is no pressure, not even atmospheric, and the temperature will be about 210 degrees Fahr. It is next to impossible to produce and maintain a complete vacuum, or what is known as 29.92 inches. Water under complete vacuum will boil at 98 degrees Fahr. But in heating systems no such a thing as a complete vacuum would be necessary.

Our inquirer states that water collects in the radiators when the fire goes down. Certainly, but in his case the vacuum is working against the boiler instead of with the boiler, and just as soon as he breaks the vacuum the water will return naturally by gravity. Suppose, however, that steam was generated and no air let out of the radiators, particularly in a one-pipe system, the water would cause a pounding noise—water-hammer it might be called, though not in the sense that is experienced in cold water services.

A vacuum system can be made up in various ways, by using a pump or some other method of exhausting the air from a system.

In the absence of a pump for exhausting the air and maintaining a vacuum, there is the Vacuo-vapor method. This is a system in which vapor steam or a few ounces of pressure is used. Thus steam enters a receiver and condenses. In so doing it contracts, of course, and sets up a vacuum on the system. But it must not, therefore, be confused and called a vacuum system.

Furthermore, it is very seldom, if ever, that either a vacuo-vapor or vacuum system is installed with one pipe. They re-

OSBORNE HOUSE, ISLE OF WIGHT
FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

ROYAL PALACE OF LA MAGDALENA
SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN

SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

Standard Sanitary Mfg. Co.
Limited

General Offices and Factory: Royce and Lansdowne Aves., Toronto, Ontario

TORONTO STORE
55-59 Richmond Street, West

HAMILTON STORE
20-28 Jackson Street, West

BALMORAL CASTLE
SCOTTISH RESIDENCE OF THE KING AND QUEEN OF ENGLAND

THE QUIRINAL
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ITALY, ROME

BUCKINGHAM PALACE
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ENGLAND, LONDON

PALACE OF THE KING OF THE BELGIANS
BRUSSELS

quire two pipes and sometimes an air line in addition to exhaust the air independently.—Editor.

THINGS TO REMEMBER

When installing a pneumatic water system it is well to remember that high pressures are more wasteful than normal pressures.

For instance, suppose a pressure of 65 or 70 lbs. is registered at the gauge and the w.c. is flushed, the moment the handle trips up the flush ball, it rises to the top of the water and falls as the water in the tank falls.

During all this time the supply valve at the high pressure named is allowing an extra large volume of water to flow, and consequently a greater amount of water is being emptied into the w.c. bowl.

Whereas, if the highest pressure is, say, normal, or about 45 lbs., the emptying operation will be just as quick, if not quicker, and the filling operation will be under a lower pressure, thus not passing or forcing as large a quantity of water out.

It will, therefore, be seen that for an ordinary house or normal height the maximum pressure of 45 lbs. would be all that is necessary. With low pressure at, say, 20 lbs. or 25 lbs., three gallons of water for one flush is ample for an ordinary w.c.

This problem if watched can result in the saving both in power and wear and tear of the pumping system.—Editor.

CANADIAN PATENTS

(Continued from page 16.)

3. A water faucet comprising in combination, a hollow cylinder to one end of which the water service is connected, a chambered valve body connected to the end of the cylinder opposite the water service connection, said chamber having an axial aperture from the cylinder, and a delivery outlet from the body in connection therewith, a buoyant piston endwise movable within the cylinder, a valve seating on the side of the aperture of the valve body which is toward the cylinder, a valve stem separate from the valve and endwise movable through the end of the body opposite that in which is the valve, a lever fulcrumed outside to the body and engaging the outer end of the valve opening stem, a pin projecting radially from the stem where it passes through the body of the valve, which pin is movable in a groove provided for it in the bearing of the body, and means for rotating the stem when the pin is discharged from the groove in the bearing.

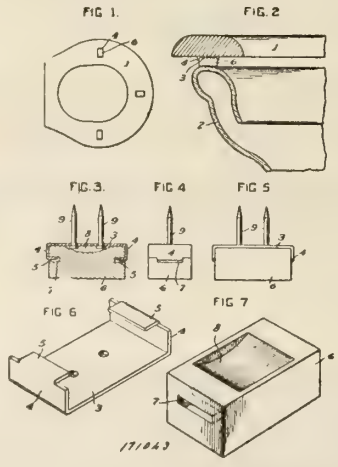
No. 171,043.

Adam A. Long, Rochester, New York, U.S.A., 25th July, 1916; 6 years. Filed 10th June, 1916. Receipt No. 266,533.

Claim.—1. An elongated cushion body for buffers having a pocket in one wall thereof formed with a bottom curved transversely only, to render the body more flexible in a transverse direction than longitudinally.

2. A buffer having in combination a cushion body transversely flexible, and provided with recesses in opposite ends of less width than the body and spaced from opposite sides thereof, and an attaching member comprising a base plate against which the body rests, integral laterally extending end positions spaced apart on said plate between which the body lies, and inwardly turned lugs at opposite ends of less width than the body projecting into said recesses to lock said cushion body against lateral shifting on said base plate.

3. A buffer having in combination an elongated cushion body provided with a pocket having a bottom wall curved transversely only to render the body more flexible in the transverse direction

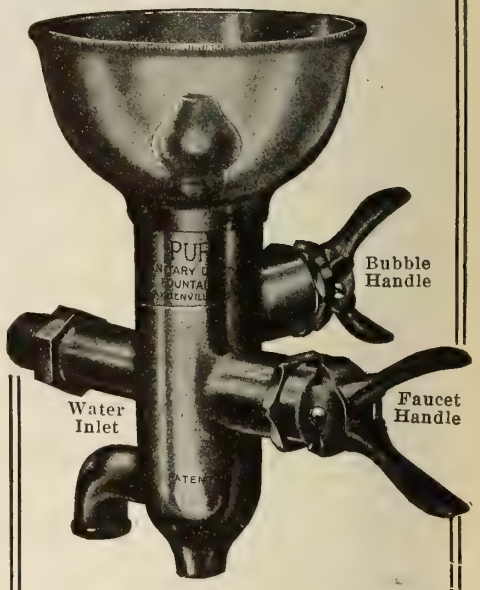


No. 171,043. Buffer.

than in the longitudinal direction, and recesses in opposite ends, and an attaching member having a surface against which the pocketed face of the body rests, and also having spaced means in opposite ends entering the recessed ends of said body to hold the latter to the attaching member.

4. A buffer having in combination an elongated cushion body provided with a pocket in one face having a bottom wall curved transversely only to render the cushion body more flexible transversely than longitudinally, and also provided with recesses in opposite ends, the recesses being shorter in length than the body is wide and spaced from opposite sides of the body, and an attaching member embodying a plate against which the pocketed face of the body rests, said plate having fastener openings under the pocket, integral laterally turned portions spaced apart on the plate and receiving the body between them, and inwardly turned lugs on the laterally turned portions fitting in said recesses and locking the cushion body against lateral shifting on said base plates.

PURO
(MADE IN CANADA)
Saves Dollars
Why let that old-fashioned faucet go on year after year wasting water—MONEY?
Why more drinking cups and glasses, only to become unsanitary—lost, broken or carried away?
Puro Sanitary Drinking Fountain stops all this needless waste. Puro saves you 35% on the water bill alone. Puro saves you all that money you spend for cups. YET Puro is always ready with a clear, cool drink with dollars in the bank.



Puro Pays for Itself
You don't have to wait years to get back the small investment you have tied up in Puro equipment—
You start cashing in at once—not only on your water bill saving, but on the increased efficiency of your workers as well.
Men like PURO—it's clean. No danger of deadly germs lurking in its sparkling bubble.
Write us—tell how many men, how many departments, and we'll tell you how much the cost will be to
"PURO-FY"
YOUR WATER SUPPLY
Puro Sanitary Drinking Fountain Company
147 University Ave., Toronto, Canada

DON'T STOP ADVERTISING.

Keep your name to the front, so that you are in the market for the business that is going and for the new business that is coming. Do not let the world think that you have "gone under."

Mr. Licensed Plumber:

GAS BULLETIN

Are inquiries coming in for auxiliary heating?

Radiant gas fires will give your client the needed heat.

They are efficient—clean—instantaneous—odorless and economical.

Phone Adelaide 2180 for further information.

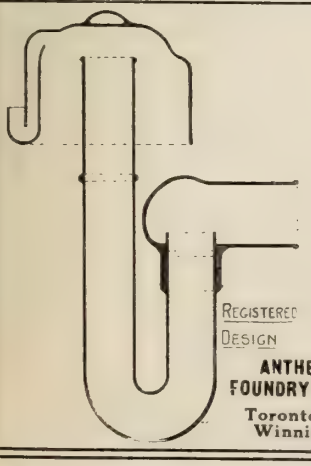
CONSUMERS' GAS COMPANY
12-14 Adelaide St. West, Toronto

Our Mixed Metal Sales Amount to Over $5,000,000 Annually

HOYT'S WIPING SOLDER is as perfect as experience and first class ingredients can make it. As only one perfect Wiping Solder can be made we manufacture only one grade, which must necessarily be Hoyt's high standard of quality.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends. Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO
New York, N. Y.; London, Eng.; St. Louis, Mo.



IF IT'S SYPHONS, ASK US

And look at this one. Note the long caulking length.

Ask us about our inside vented syphon. It's a dandy. Saves making many joints.

We unconditionally guarantee every syphon to operate automatically. And it has no moving parts.

Ask your jobber for "Anthes" Syphons and accept no other.

ANTHES FOUNDRY, LIMITED

TORONTO and WINNIPEG

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Bubblers.
Empire Mfg. Co. Ltd., London, Ont.
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Cellar Drainers.
Empire Mfg. Co. London, Ont.
Galt Brass Co., Limited.
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Chain Wrenches.
Trimont Mfg. Co., Roxbury, Mass.

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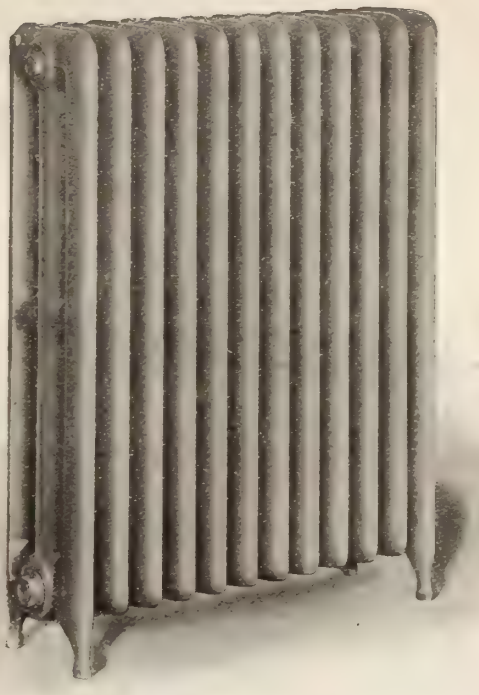

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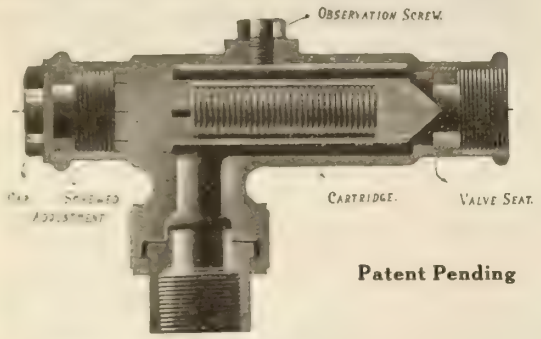

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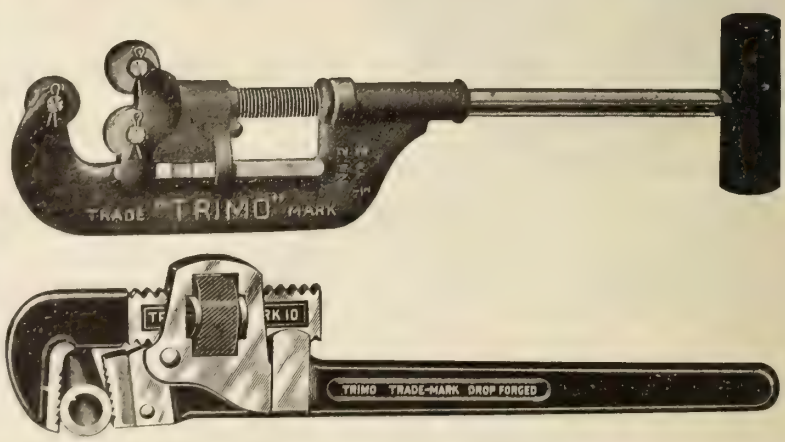

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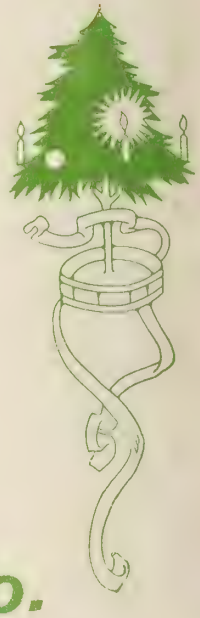

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